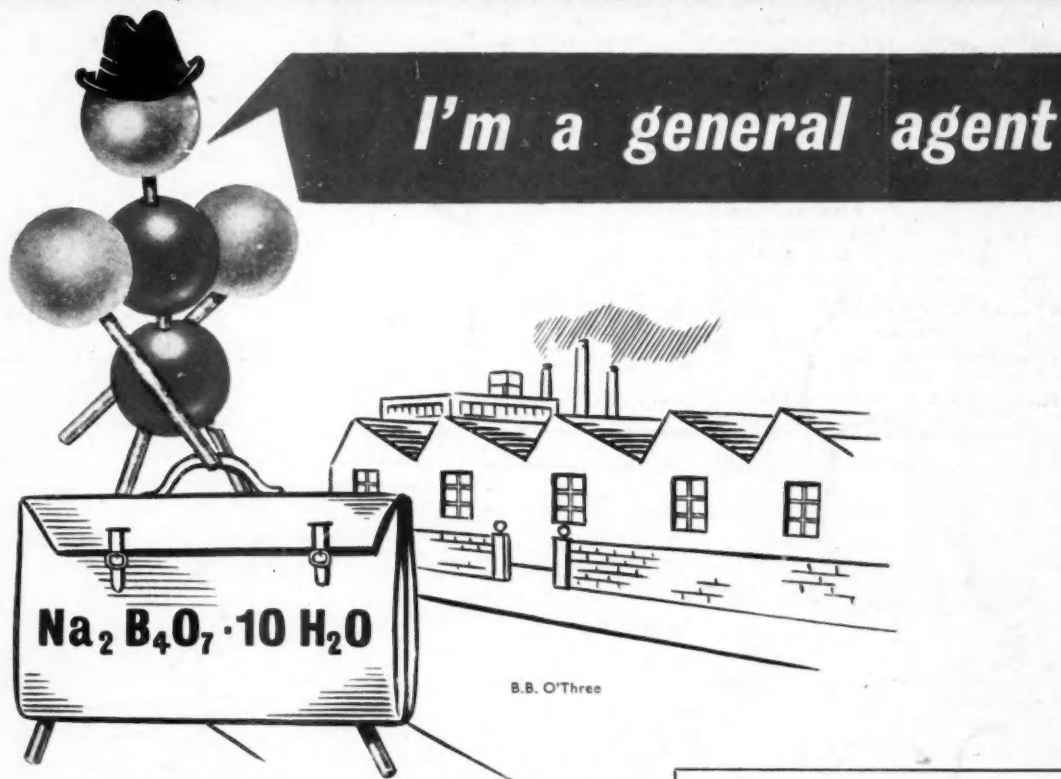


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VOL. 77 No. 1967

23 March 1957



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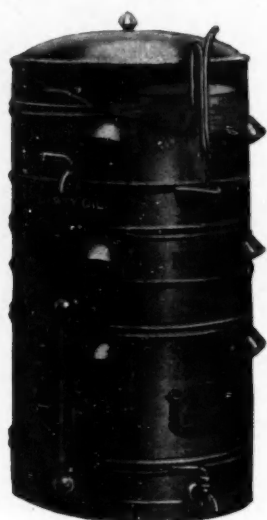
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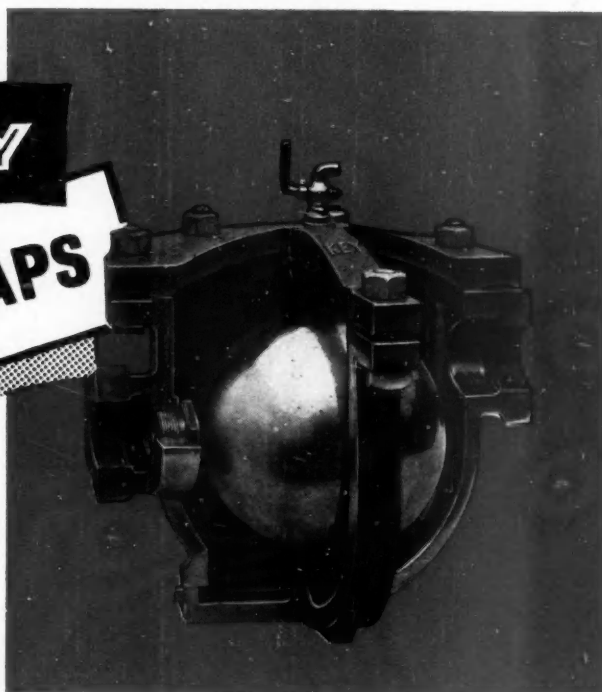
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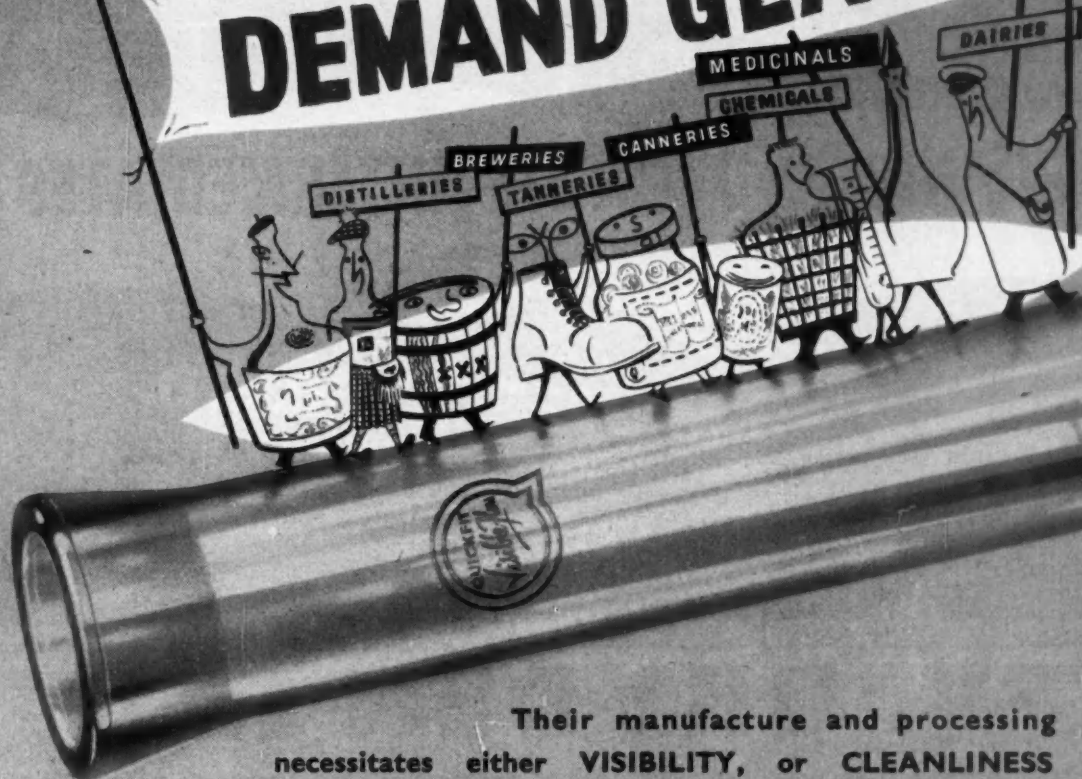
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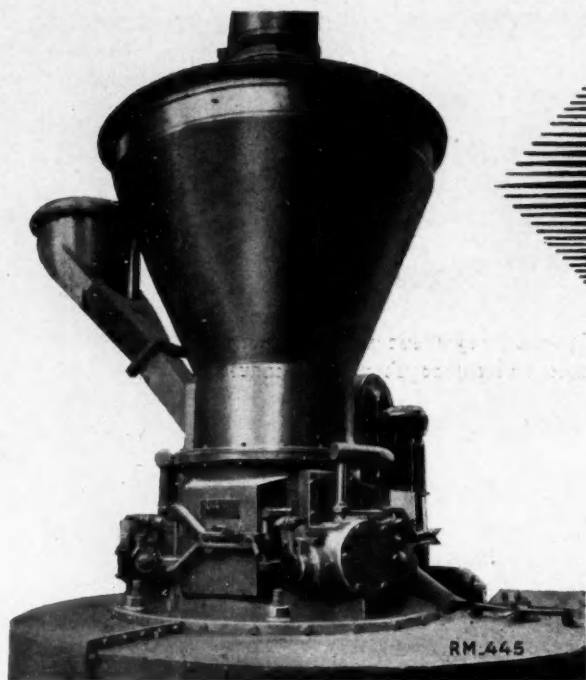
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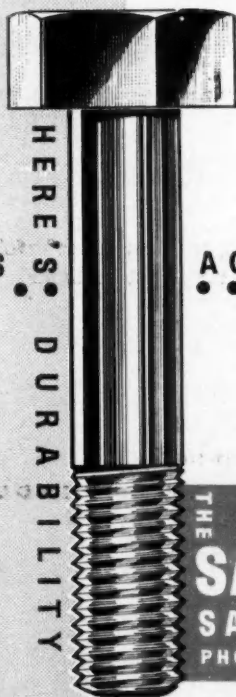
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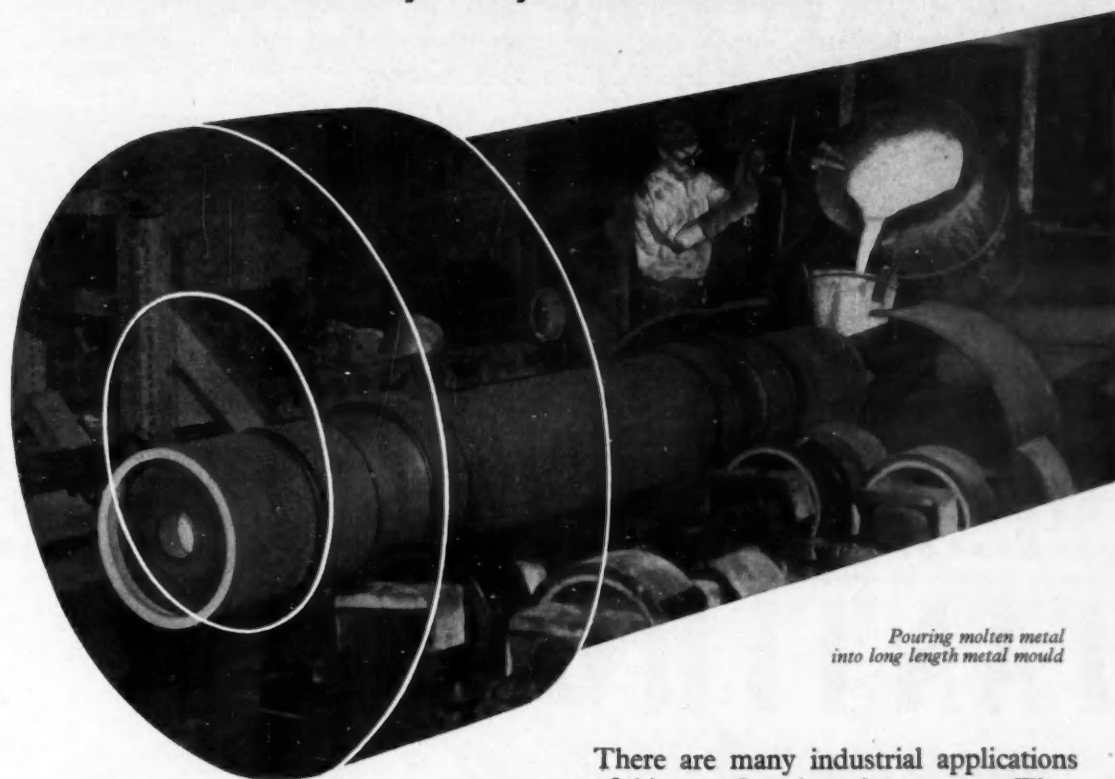
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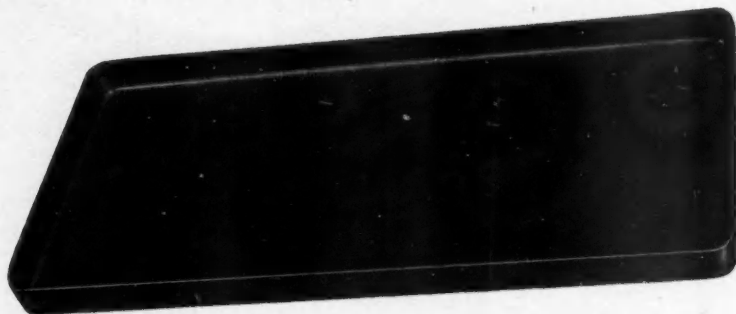
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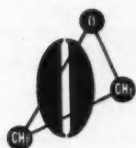
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C

# CHEMICAL AGE

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## REWARDS FOR RISKS

**R**EPORT on the industrial activities of The Distillers Co. Ltd., which is being distributed to shareholders, is reviewed on page 499. The lavishly illustrated booklet gives a comprehensive picture of the company. Undoubtedly shareholders and others will now have a clearer idea of DCL's progress, particularly in the chemicals field.

It is learned, for instance, that £28 million has been invested in chemicals—from plastics to penicillin—and food. But nowhere is it indicated what profits these new projects are earning. This has intrigued the financial world and been the subject of comment in the national press.

Particularly interesting is a report in the financial page of the *Evening Standard* (15 March). This states that a Stock Exchange firm has probed balance-sheets of Distillers' new interests on the official files in Edinburgh and London, and from these it is discovered that DCL's chemical activities yielded net profits totalling £1,676,000 last year. This is a gain of £370,000 on the previous year. However, these profits cannot be considered a particularly high return for such heavy investment. Net profit on DCL's plastics projects was £565,000 last year on book value investment of £8,389,000, and it thus appears that it is in plastics that the greatest interest lies.

Thus although DCL now has 25 per cent of its interests in the field of chemicals, plastics, pharmaceuticals and foods, whisky and gin still provide 80 per cent of the profits. But it must be emphasised that it can be considered early days with regard to DCL's chemical interests, and it will be interesting to compare net profits from the various groups in five years' time.

Recently a deputy chairman of Imperial Chemical Industries Ltd., Mr. S. P. Chambers, broadcasting in the BBC's Third Programme on 'The conditions for investment' touched on the question: What forecast return on capital is needed before expenditure on plant for a new product is undertaken? The answer is not simple and it is not uniform for all cases.

Mr. Chambers stated that above the profit needed to pay dividends and profits tax, a margin is required to cover plant and machinery replacement costs. A further margin is needed to allow for the period of construction when no profit will be earned. This period may be 'anything from six months to six years or more if heavy constructional work—is involved.'

It was also pointed out by Mr. Chambers that the estimated return on the capital invested is not the only factor to be taken into account. Other factors are rapid obsolescence, or research expenditure not directly related to the products or processes but incurred in an attempt to discover better processes or products. He referred particularly to the pharmaceutical industry in connection with this.

In this industry research expenditure represents a high proportion of turnover. In fact, Mr. Chambers said 'A margin of 50 per cent over the manufacturing cost of a particular drug, before taking into account research expenditure as a whole, may actually be too low to justify maintaining the research expenditure necessary to keep up the manufacture of new drugs as the old ones fall by the wayside.' Distillers' have only been associated with the pharmaceutical industry for some 13 years and undoubtedly a



great deal of money has been and is still being spent in this division of the company.

As Mr. Chambers goes on to say, 'fixed notions of what is a reasonable margin of profit on manufacturing cost or a reasonable return on capital expenditure can do so much harm if those notions lead to such restrictions of profit margins that insufficient is left to finance the research necessary to keep the industry alive.'

Perhaps the most significant of all Mr. Chambers'

remarks, considered in relation to the Distillers' Company is that 'From a given set of raw materials, or from what would otherwise be the waste materials from other manufacture, it may be worth extracting additional products, even if the return on the capital needed to put in additional plant or equipment appears to be low. It clearly pays to make the extra product if the additional profit from doing this is greater than the costs incurred, including servicing the capital.'

## GRADUATES' SALARIES

MUCH HAS BEEN said recently on the subject of graduates' salaries since salary is an important factor in attracting persons with the right qualifications into industry and the professions in adequate numbers. This is particularly the case in the chemical and engineering industries. However, until recently little systematic information has been available on which a comparison of salaries received in various walks of life could be made.

A pioneer contribution was made to this problem by the survey published by Political and Economic Planning in the latter half of last year (see *CHEMICAL AGE*, 27 October 1956, page 165) on *Graduate Employment*. In that survey, the salaries received in the first post after graduation in 1950 were compared with what was received at the time of the survey in 1954. Now the latest survey by PEP published on 18 March on *Salaries of Graduates in Industry* examines in greater detail the salaries of graduates who entered industry.

Between £550 and £775 is now being offered to both scientists and technologists at the outset of their careers compared with between £500 and £760 for arts graduates with most offers running between £550 and £650. This compares with £500 a year for scientists in 1951 and £434 for technologists.

Science or technology graduates who went into industry started with salaries more or less average for graduates in these faculties, but arts graduates usually started with salaries that were, on the average, a little lower than salaries of arts graduates elsewhere, in particular, the teaching profession where contrary to common supposition, starting salaries were high.

Industry's generous pay has had serious effects on the numbers of candidates for the Civil Service and on men available to teach science in schools. Both professions have now increased their salary scales. A scientific officer now starts at £665 after national service and a graduate teacher with a good honours degree at about £700 a year. As these rises are recent, it remains to be seen what the effect on the competition from industry will be.

It is in the analysis of the difference between salaries received in the various industries by arts men, scientists and technologists in this sample (a small one of 600 graduates) that the most unexpected results appear. At the starting salary stage, arts graduates were up to £70 behind the scientists and some £10 in advance of the technologists. But some four years later the most highly paid posts were being given to some of the arts men, presumably promoted to positions of responsibility in management. It should be pointed out, though, that the arts graduates were rather older than the other graduates. How far the progress of the arts men can be attributed to their having read for an arts degree is therefore uncertain.

No correlation of significance was found between the size of the establishment joined and the level of salary paid. But interesting differences came to light when the product of the firm was examined. Mining and quarrying, oil, and chemicals and allied industries paid higher salaries at both stages. Public utilities paid low salaries, although the National Coal Board was the exception. Industries varied most in the salaries paid to technologists.

The cash value of a First Class Honours degree is indicated in the survey, since this qualification increased a median salary by £93 a year, and even after four years, men with 'Firsts' were some £69 a year better off, although the difference between Second Class and Pass degree graduates had disappeared or had been reversed.

Two conclusions are drawn from this survey. The first is that industry has not been failing through its salary policy to make itself attractive to graduate labour. Industry has in fact been successful in attracting into its ranks two-thirds of the technology graduates, nearly two-fifths of the scientists and one-eighth of the arts graduates and a comparable proportion of men with a First Class Honours degree.

The second conclusion to be drawn relates to the value set by industry on the men it recruited over the period under review. At the starting salary stage, an advantage to scientists was offered, but this was not substantial. What does stand out is that the greatest advances in salary in this period were not going to the scientists and technologists. Unfortunately it is not known what work these arts graduates were doing, but it is presumed that this was in the management line of command. In fact, the results of this survey seem to indicate quite strongly that at the rate of the level of seniority represented by the sample, some management posts are more highly paid than any work on research or production.

Obviously, there is a need now for an inquiry into the salaries earned by men between 30 and 40 years of age. A salary policy which reserves its highest rewards for arts graduates is not likely to encourage men to read science and technology rather than history or languages or some other non-technical subject.

## COAL GASIFICATION PROGRESS

REFERENCE was made in *CHEMICAL AGE* (29 December 1956, p. 506) to a pilot plant scheme for the complete gasification of underground coal. Experiments have now progressed sufficiently, according to an announcement by Sir Harold Smith, chairman of the Gas Council, for the gas industry to require large scale investigations on a small commercial scale.

It is believed that the site for the plants, which will have to be near an oil refinery as well as a coalfield, will very likely be located in the North-West of England.

Development of the large-scale plans may well be a major undertaking. Complete gasification of small coal of poor quality which has been lost to industry, should mean purer and, very possibly, cheaper gas.

It seems likely that the gas industry is now to add to its range of activities and that it will be responsible for extracting valuable new products which are being sought by the newer industries in the UK, and in particular, the plastics industry.

The gas industry, it is understood, wishes to investigate gasification of oil as completely as possible so that methods and plant may be adapted at a later stage to complete gasification of poor coal.



# INDUSTRIAL ACTIVITIES OF THE DCL GROUP

## Rapid Growth in the Last 10 Years

**P**RODUCTION of acetone by The Distillers Co. Ltd. at Hull rose from 3,000 tons in 1930 to 30,000 tons last year. Total investment of British Hydrocarbon Chemicals Ltd., including their share in subsidiaries, will be £22 million when all expansion projects are completed.

These are two of the interesting facts disclosed in an illustrated brochure issued to DCL shareholders. Details are also given of DCL subsidiaries and its interests in many associated chemical companies.

In a foreword to this report, entitled 'The Industrial Activities of The Distillers Co. Ltd.,' Sir Henry J. Ross, chairman, states that growth of the company's industrial activities has taken place in the past 30 years and has accelerated rapidly during the last decade.

In 1955 the industrial groups provided direct employment for over 10,000 people. In the same year, the company's 21 main plants made and sold many thousands of different products valued at £50 million, and in addition sales by associated industrial companies were valued at over £10 million.

This DCL brochure briefly reviews the historical background and formation of the various industrial groups.

Much of the company's present industrial orientation can be accounted for by the original interest of DCL in fermentation processes. It is, of course, the transition from the traditional art of whisky distilling to the large-scale manufacture of alcohol and organic chemicals that has given the company an exceptionally wide experience of distillation processes.

### DCL's Divisions

DCL chemicals fall into four main classes: chemical intermediates, solvents, plasticisers and special products, such as surface-active agents and lubricating oil additives. Included in the chemicals group are the industrial alcohol division, which also markets the synthetic ethyl alcohol made from oil by 50 per cent DCL-owned British Hydrocarbon Chemicals Ltd., at Grangemouth; the Methylating Co. Ltd., which distributes 'methylated' spirits; the carbon dioxide division; British Industrial Solvents division; Murgatroyd's Salt and Chemical Co. Ltd. (owned 50 per cent in conjunction with Fisons Ltd.); and DCL's Commonwealth associates.

Now a DCL division, the Carbon Dioxide Co., was formed to develop industrial uses of carbon dioxide obtained as a by-product of fermentation. Recent new large scale uses for the gas include foundry and engineering applications and large quantities of DCL carbon dioxide are used as a heat exchange medium in the Calder Hall atomic power station.

The company has been responsible for developing two methods of transporting carbon dioxide, i.e., as solid carbon dioxide or dry ice in insulated containers and in liquid form in bulk in pressurised road tankers.

DCL has been well placed to supply the growing market for solvents. In the 'twenties, acetic acid, acetone and butyl alcohol were produced at Hull from DCL industrial alcohol as raw material, and later acetic anhydride. Continuous units for acetic acid and acetic anhydride have been installed at the Hull centre and modern plants to make ethyl acetate and other solvents have been built to supplement older units at Carshalton. With the company's entry into petrochemicals, the acetone plant at Hull was the first to use isopropyl alcohol.

Because of the demands for plasticiser by the rapidly developing British plastics industry, large extensions have been made at Hull, including units to produce higher alcohols, phthalates and other chemicals used as plasticisers. Output of finished products from the Hull area now exceeds 80,000 tons a year. Butyl alcohol and acetone obtained directly from molasses by bacterial fermentation are produced at Commercial Solvents (Great Britain) Ltd., Bromborough. Some derivatives are made, including butyl acetate and dibutyl phthalate plasticisers, while carbon dioxide is recovered as a fermentation by-product.

The largest calcium carbide factory in the UK, operated by British Industrial Solvents at Kenfig in South Wales, is important as the basis of DCL's production of p.v.c. and vinyl acetate.

Additives for lubricants are produced by Orolins Ltd., jointly set up by DCL and Oronite Chemical Co. of California in 1954. Vinyl acetate from acetylene and acetic acid is produced by the recently completed plant of Hedon Chemicals Ltd., formed in 1955 by DCL and Shawinigan Chemicals Ltd. A further company, part owned this time with the Atlas Powder Co. of America is Honeywill-Atlas Ltd., which produces and sells surface-active agents.

DCL's most important post-war development was its entry in 1947 into the field of petroleum chemistry, by the formation, in partnership with British Petroleum, of British Hydrocarbon Chemicals. Production of ethyl and isopropyl alcohols from ethylene and propylene started in 1951, now amounts to about 60,000 tons of ethyl and 30,000 tons of isopropyl alcohols a year.

Butadiene is now being produced at Grangemouth as well as styrene, which is produced in plant owned by Forth Chemicals Ltd., formed in 1950, with British Hydrocarbon Chemicals, holding a two-thirds interest and Monsanto Chemicals Ltd., a one-third interest.

British Hydrocarbon Chemicals also hold a two-thirds interest and the Oronite Chemical Co. of California a one-third interest in Grange Chemicals Ltd. formed in 1955 to manufacture alkyl benzene, essential intermediate for high-grade synthetic detergents. The company is now to set up a low-pressure polythene plant to manufacture 11,000 tons of polythene a year.

Overseas, DCL runs in partnership with the Colonial Sugar Refining Co. Ltd., of Australia, C.S.R. Chemicals (Pty.) Ltd.; which produces organic chemicals including plastics, solvents and plasticisers, and in South Africa, DCL has a large holding in National Chemical Products Ltd.

### Plastics Group

Basic plastics materials are manufactured by DCL's plastics group, British Resin Products Ltd. produces synthetic resins and BX Plastics Ltd., 50 per cent owned by DCL, manufactures various thermoplastics, including polystyrene. With BF Goodrich Chemical Co., US, DCL formed British Geon Ltd., DCL owning 55 per cent of the shares. Polyvinyl chloride is produced by British Geon Ltd., and from an output of 3,000 tons a year in 1948, production has increased to 27,000 tons a year in 1956.

In 1954, DCL joined with the Dow Chemical Co., US, to form Distrene Ltd., to manufacture polystyrene materials. This company's plant at Barry came into full production in January 1956. DCL owns 55 per cent of Distrene Ltd.

Now a division of DCL is the Distillers Co. (Biochemicals) Ltd., which produces the antibiotics—penicillin and streptomycin, and vitamins, particularly vitamin B<sub>12</sub>. The DCL food group companies form Britain's largest distributing house for yeast for bakeries.

Central departments to provide specialist services throughout the company have been set up and today more than 250 graduate scientists are employed on research and development, assisted by about 600 junior staff.

Design and development of new specialised instruments and equipment is undertaken in a section of the central research department in collaboration with the engineering division and operating groups.

### Lead Zirconate, a New Ceramic Material

A new ceramic material, lead zirconate, is being manufactured in the UK by Brush Crystal. It is claimed it can be used in place of hafnium titanate in electronic equipment such as ultrasonic generators.

The particular advantage of lead zirconate is that it can be operated efficiently at temperatures of up to 300°C., whereas barium titanate cannot be used safely at temperatures in excess of 60 to 70°C. Also, lead zirconate can operate at higher electrical power loadings. If it is accidentally overheated it will completely recover its full operating efficiency as soon as it has cooled down.

## PREPARATION AND PROPERTIES OF POLONIUM AND DERIVATIVES

**B**ETWEEN 1898 and the early '40s several people worked with polonium but no-one had ever isolated sufficient to see it or to weigh it. When research was put in hand in 1944 immense difficulties faced the research workers as can be seen from the fact that, to produce 1 mg. of polonium, amounts of uranium of the order of several hundredweights are required.

However, its extreme alpha activity allows detection and manipulation of minute amounts and Professor W. C. Fernelius of Pennsylvania University described in detail the preparation of polonium and its derivatives and their properties in a lecture to a recent combined meeting of the Alembic Club, Oxford, and the Thames Valley Section, Royal Institute of Chemistry.

Polonium-210 occurs among the isotopes of mass 200 to 218 and the half-lives of these isotopes range from  $10^{-2}$  seconds to 138.4 days. Polonium 208 has a half-life of 2.93 years while that of polonium 209 is 200 years. The 210 isotope is produced not very suitably by high energy bombardment of bismuth-209 in an atomic pile. Although bismuth-209 is fairly transparent to neutrons some of these are captured, and the bismuth isotope 210 is formed (Radium E). On losing a beta particle (half-life 5 days) the product is polonium 210.

Professor Fernelius then described in detail the chemical methods used in removing the aluminium container and the separation of the polonium from the bismuth by solution, precipitation and electro-deposition of the polonium to obtain a 100-fold concentration and the various routes from this point for obtaining the polonium in the pure state.

Providing the solution is sufficiently pure, polonium is formed in the solution and may be removed about once every

three months by co-precipitation with bismuth oxychloride. The repurified lead 210 solution yields a further quantity of polonium after three months and the whole process can be repeated indefinitely.

**Properties.** If the electro-plated bismuth is examined in the dark it appears to have a yellowish glow. The polonium is grey but can be produced as a bright mirror, is soft as lead, readily volatilised in vacuum and readily oxidised. It is almost a pure alpha-emitter and is a better source of alpha particles than radium. Its activity is 4.5 curies per mg., it emits 27.4 calories per hour per curie, its density is over 9, m.p. about 250°C and its b.p. 962°C. It has been obtained in two allotropic modifications, the lower melting belonging to the cubic system and the higher exhibiting the rhombic form.

Confining polonium in glass is difficult since the alpha particle bombardment rapidly crazes the glass while the helium liberated produces an internal pressure. The X-ray spectrum of a polonium salt is very difficult to obtain due to the continuously changing composition of the salt, the lattice of which is being continuously destroyed and fluctuates rapidly due to the intense internal bombardment by alpha-particles.

**Compounds.** Polonium dioxide is obtained by direct oxidation of the metal or by decomposition of the nitrate. It is decomposed when heated in vacuum but in an atmosphere of oxygen is stable at 900°C. The tetrachloride, bromide, iodide di-chloride, di-bromide and sulphide are known. The latter on heating decomposes giving the pure metal. Some double chlorides, the sulphate and a number of binary compounds with metals such as zinc, lead, silver, etc., have also been prepared.

### Oxygen Demand of Trade Effluents

FORMULATION of standard methods of analysis for aqueous liquids of different degrees of impurity was considered by Mr. C. J. Regan in his paper, entitled 'Oxygen demand of trade effluents with respect to river pollution,' presented at a recent meeting of the Western Section, Society for Analytical Chemistry. Mr. P. J. C. Haywood, section chairman, presided.

Mr. Regan discussed three methods of assessing the oxygen demand of a trade effluent. These were: absorption from acid potassium permanganate; absorption from acid boiling potassium dichromate; and biochemical oxygen demand. These tests are recommended by the panel of the joint committee of the Association of British Chemical Manufacturers and the SAC, which is now sitting.

The second method is a new feature in British practice and received special attention as did the manometric (or respirometric) procedure for biochemical oxygen demand determination.

### Nuclear Research Institute sets up Physics Committee

Governors of the newly set up National Institute for Research in Nuclear Science held their first meeting last week and appointed a physics committee with the primary responsibility of examining proposals and designs for the construction in this country of a large accelerator.

The Institute's main task will be to provide for common use by universities and others facilities and equipment, which would be beyond their usual scope, for the carrying out of research in the nuclear field.

### Two Records for OCCA Exhibition

A record number of visitors—5,000—attended the ninth technical exhibition of the London section, Oil and Colour Chemists' Association held last week from 12-14 March. The number of stands, 81, was also a record. Overseas visitors came from many countries, including Australia, Canada, Hong Kong, India, New Zealand, South Africa, the US, USSR, and the Continent.

### BoT Price Index for Chemicals

WHOLESALE PRICE index of the Board of Trade shows that the price of chemical and allied products rose slightly in February to a figure of 142.8 (provisional) against 142.1 in January and 137 in February 1956. The following is an extract from the index (30 June 1949 = 100):

Product	February 1956	January 1957	February 1957
Dyes & dyestuffs	138.0	143.1	143.1*
Insecticides, weed-killers & fungicides	135.7	135.5	135.5
Synthetic resins & plastics materials	123.1	124.1	124.1†
General chemicals	154.5	161.7	162.2
Benzole, pure	182.9	217.1	217.1
Caustic soda liquor, 100°TW	151.9	157.6	157.6
Soda ash, light (d/d)	159.6	164.5	164.5
Soda ash, light (f.o.r. works)	167.3	173.4	173.4
Sulphuric acid, 80V	173.7	173.7	177.2
Sulphuric acid, 80V, 94/95%	181.8	181.8	181.8
Soaps, candles & glycerine	118.8	124.2	124.5
Ethyl alcohol, industrial, BS507/1953	146.7	156.7	156.7
Carbon black	130.2	131.8	132.5
Fertilisers	198.0	200.9	203.6
Pyrites, c.i.f. UK ports	185.1	175.8	181.6
Rubber, No. 1, RSS, one month future	302.0	288.2	260.2
Sulphur, crude (for acid making) c.i.f.	178.6	190.1	188.3

\* Provisional.

### New Laboratory for Epoxide Based Coatings

LABORATORIES of Mody and Co. Ltd., paint manufacturers, Warrington, are to be extended to provide additional facilities for research in the product finishing and maintenance painting fields. A new single storey building covering a ground area of about 2,000 sq. ft. is now being built. It will be equipped and ready for use by June of this year.

Until 14 years ago, Mody's specialised in paper varnishes, french polishes and spirit enamels, etc. The widening of their interests resulted in the company being one of the earliest surface coating manufacturers to develop paints based on Epikote resins and the new laboratory will be largely devoted to work with these materials, thus freeing the existing laboratories for more general investigations.

### Acheson Colloids Announce New Rubber Lubricant

Acheson Colloids Ltd., 18 Pall Mall, London SW1, have added a new rubber lubricant to their range of Gredag greases. Designated Gredag graphited grease grade RB5, this bentone-base grease is claimed to have characteristics that make it suitable for use in conjunction with rubber.

Grade RB5 has a broad temperature range, from -55°C to +200°C, and is resistant to water, steam and most aqueous solutions. It is said to have a fairly good resistance to hydrocarbon oils and solvents, and its consistency is stated to be unaffected by rough handling or working.



# PHYSICAL SOCIETY EXHIBITION

## New Developments in Instruments and Apparatus on Show Next Week

**W**HEN the Physical Society exhibition of scientific instruments and apparatus opens at the Royal Horticultural Hall, London SW1, on Monday 25 March many new developments will be shown for the first time. In addition, a number of prototypes exhibited last year will this year be featured as production models incorporating many improvements.

Some of this wide range of new and improved instruments and apparatus is briefly previewed below. Full details will be available on the stands of the companies and organisations concerned. In numerous cases models described here will be demonstrated by fully qualified staff. Stand numbers are indicated in bold type.

### Tubes of Special Metals

Tubes in metals such as tantalum, beryllium, vanadium, molybdenum, zirconium and titanium are recent developments by **Accles and Pollock Ltd.**, Oldbury, Birmingham. Examples of straight and manipulated tubing in some of these special metals will be exhibited. (54).

### Interference Microscopes

A surface finish interference microscope is to be shown by **C. Baker of Holborn Ltd.**, Metron Works, Purley Way, Croydon, Surrey. The optical system after Mireau leads to a compact design in which the beams are only separated for a very short distance. Paired objectives are not required. Two powers of objective— $\times 10$  and  $\times 40$ —are made and each power is now available with a reflectivity suitable for non-metallic surfaces, as well as the original lenses for metal specimens. The microscope is of original design and has doors which fold back in use; a camera is provided.

Also on show will be the Baker-Smith interference microscope which is considerably enhanced by the use of a special half-shade eyepiece. Another accessory is the fringe pattern, made available for those wishing to employ the fringe-deformation method of measurement. A mercury vapour lamp has been developed for use with these instruments to fulfil the exacting requirements of the interference microscope. It is equally useful for ultra-violet and fluorescence microscopy. (86).

### Research Microscopy

The 56 research binocular microscope for observations by normal illumination methods, shown last year, is now equipped with accessory fittings for polarised light phase contrast, photomicrography and measurement. **R. and J. Beck Ltd.**, 67 Mortimer Street, London W1, are introducing a new stereoscopic binocular with objective turret. Incorporated is a convenient method of rapidly changing the magnification.

A special range of eyepieces with large

fields of view has been designed and the magnification, adjustable in equal increments, can be varied between 4X and 100X. The microscope is shown on a versatile bench stand with permanently aligned lighting from above.

Developed in collaboration with several metallurgical research associations, the 1600 automatic grinding and polishing machine provides facilities for the rapid production of polished metal samples for microscopical investigation. The specimen holder, for one of three specimens, is reciprocated automatically relative to the abrasive disc; speed of the main spindle is adjustable. Several years of maintenance free use is claimed. (95).

### Analmatic Uranium Analyser

Demonstrations of the Analmatic Uranium Analyser, Mark II, will be given by **Baird and Tatlock (London) Ltd.**, research and development division, 14-17 St. Cross Street, London EC1. This instrument is employed for the rapid chemical analysis of effluents from ion exchange columns in uranium liquid flow lines. Analyses are performed day and night without human intervention, monitoring up to 16 'barren' and/or 'semi-pregnant' process streams. An absorptometric technique is used. The cycle of events is entirely automatic and a permanent record of the uranium concentrations in individual streams is produced.

To act as a safety device in a system

### OPENING BY PROFESSOR P. M. S. BLACKETT

Opening ceremony will be performed in the New Hall on 25 March at 11 a.m. by Professor P. M. S. Blackett. Hours of opening are 25 March 2-7 p.m. (10.30 a.m.-2 p.m. members only); 26 March 10 a.m.-9 p.m.; 27 March 10 a.m.-7 p.m.; 28 March, 10 a.m.-4.30 p.m. Tickets may be obtained free of charge from the Physical Society, 1 Lowther Gardens, Prince Consort Road, London, S.W. Demonstration lectures will be given at 6.15 p.m. as follows during the exhibition: 25 March, "International Geophysical Year", by Sir Harold Spencer Jones; 26 March, "Supply and Distribution of Liquid Helium", by Dr. E. Mendoza; 27 March, "Recent Trends in Acoustics", by Professor E. G. Richardson. Tickets are not required.

through which it is essential to maintain a definite rate of flow of liquid, Baird and Tatlock have developed a liquid flow monitor. This consists of a vertical glass tube in which two probes are placed, one above the normal liquid level and the other below it. Any change in the rate of flow causes a relay circuit to operate an alarm signal. Accurate titrations at high dilutions with small volumes of sample are claimed for the firm's titration absorptiometer. This instrument was originally designed for the determination of calcium and magnesium in body fluids using ethylene-diamine-tetra acetic acid. The optical system used minimises dilution errors.

Also to be shown is a continuous flow absorptiometer. Simple and robust, it has been developed for use in automatic analytical apparatus in conjunction with a potentiometer recorder of either the strip-chart or the circular-chart type. Usual control forms may be fitted.

For the rapid combustion procedure developed by Belcher and Ingram (*Analyt. Chim. Acta*, 1950, 4, 401; 1952, 7, 319), the first for carbon and hydrogen determination and the second for halogens and sulphur, Baird and Tatlock have now produced two micro furnaces.

The Bone and Wheeler gas analysis apparatus has been redesigned to incorporate the latest modifications. (116).

### BTH Research Exhibits

Several pieces of equipment and devices from the BTH Research Laboratory will be demonstrated by the **British Thomson-Houston Co. Ltd.**, Rugby.

Infra-red radiation from a hot body with that from a standard lamp can be compared alternatively using a lead sulphide cell the current in the lamp being adjusted continuously by a transistor circuit. The instrument, known as a transistor self-balancing pyrometer, records from 150°C upwards. An electrostatic dust monitor provides a means of measuring the dust concentration of flue gas.

Electroluminescence of single crystals of zinc sulphide grown by a vapour sublimation method will be shown. When activated with varying amounts of copper and chlorine, they exhibit green or blue luminescence, upon application of a high voltage AC supply. The crystals are mounted in an inert atmosphere for protection from atmospheric moisture. (12).

### Calorimeter

The Cambridge-Thomas recording gas calorimeter, to be featured by the **Cambridge Instrument Co. Ltd.**, 13 Grosvenor Place, London SW1, is of the flow type, in which the heat transfer medium is air. Results are given directly in BThU per cubic foot at any standard condition of temperature, pressure and humidity, and performance is unaffected by any variation of these characteristics. The calorimeter is sensitive to changes of less than 0.25 BThU per cubic foot and the guaranteed accuracy is within  $\pm 0.5$  per cent of the range value. The full

## PHYSICAL SOCIETY

coverage ranges from 70 BThU per cubic foot to 2,400 BThU per cubic foot.

Differentially arranged resistance thermometers measure the temperature rise of the cooling air. Such changes are directly proportional to changes in calorific value of the sample gas. Checking against a standard calorimeter is not required, independent testing can be carried out by burning hydrogen. Calibration is maintained over long periods and little maintenance is stated to be required.

Deflection of the stable and sensitive Lindemann Electrometer can be observed and recorded by normal electronic methods using a photoelectric transducer as an amplifier, the output of which can be fed into an electronic recorder or similar device. The Lindemann Electrometer transducer may be used in conjunction with ionisation chambers, for pH deterioration, measurement of small currents (of micro-microamp order) etc. (41).

### Humidity Controller

A differential hygrometer will form one item on display by **C.N.S. Instruments Ltd.**, 61 Holmes Road, London NW5. This humidity controller continuously compares the relative humidity of the ingoing air to a chamber with that of the outgoing air and can control the process at a preset differential between the two. (59).

### Ultrasonic Cleaning Equipment

Type 413 ultrasonic generator is the production version of the model shown last year by **Dawe Instruments Ltd.**, 99 Uxbridge Road, Ealing, London W5. It embodies several new features, a more rugged construction and an improved cabinet design. Cylindrical tank transducers are available with barium titanate elements built into the base.

Two sizes available are 5½ in. diameter by 6 in. deep and 6½ in. diameter by 7½ in. deep. These have capacities of about half and one gallon respectively. Immersible transducers measure 2½ in. by 2½ in. by 9 in. overall. All assemblies are of stainless steel and highly corrosive liquids may be used by placing them within an inner plastics or glass

container. Output may be switched to either of two sockets enabling washing and swilling baths to be used alternately.

Cleaning occurs as a result of the rapid formation and collapse of vapour bubbles within the liquid. This cavitation cleanses many assemblies difficult or impossible to treat by other means and in almost all cases ultrasonic cleaning it said to afford a saving in plant or time over other methods.

An instrument which measures the thickness of material from one side by determining the fundamental natural frequency of vibration in the thickness direction is the type 1108 Visigauge. The thickness is indicated directly on a calibrated scale of a 21 in. cathode-ray tube. By choice of frequency range and crystal type, the Visigauge 1108 will measure the thickness of most metals and also many insulating materials.

The equipment can be used to detect internal defects within materials, such as laminar flaws, inclusions and lack of bond between materials. Provision of facilities for connecting up to 1,000 ft. of cable between the transducer and the equipment makes the Visigauge particularly suitable for large-scale surveys. (38).

### DSIR Exhibits

Research laboratories of the **Department of Scientific and Industrial Research**, 5-11 Regent Street, London SW1, are showing a variety of instruments.

The **Chemical Research Laboratory**, Teddington, will demonstrate a recording double-beam attachment for the Unicam S.P.500 spectrophotometer. A compact motor drive, incorporating calibration marker and adjustable cutout, is geared to the wavelength shaft, while sample cell and photocell compartments are replaced by a unit containing a simple alternate-path mirror system, and an IP28 photomultiplier detector. The unit is used in conjunction with ratio-recording equipment normally used with an infra-red spectrometer (*J. Sci. Instrum.* 1953, 30, 52). The slit width is monitored by a servo-motor to give constant 'reference' energy. Existing radiation source units are utilised but the detector requires a stable voltage source.

An automatic recorder for sulphur trioxide in gases is to be displayed by the **Fuel Research Station**, East Greenwich, London SE10. Sulphur trioxide in gases derived from the combustion of fuels is absorbed by 80 per cent isopropyl alcohol flowing continuously through a specially designed sintered glass absorber. Every eight minutes the solution collected is analysed for sulphate by adding HCl and  $B_2Cl_6$ . Turbidity, which is proportioned to the  $SO_2$  content of the gas, is measured photoelectrically and recorded on a gas recorder. In its present form the instrument is suitable for gases containing up to 100 p.p.m.  $SO_2$ . Also on show will be a portable viscometer, designed to be lowered into oil tanks to various depths to determine the viscosity *in situ*.

A third instrument from this DSIR station is the constant current power course for coulometric titration. It maintains a current constant to within 0.01 to 0.02 per cent through an electrolytic cell the impedance of which is changing. The e.m.f. across a standard resistor in the circuit is compared with that of a standard cell arranged so that if the current is at the desired value the two e.m.f.'s balance.

A precision thermostat to be demonstrated by the **National Physical Laboratory**, Teddington, has been designed for use with a liquid bath and makes use of the change of phase at balance of an audio frequency bridge network. Accuracy obtainable over a continuous period of 50 hours is stated to be  $\pm 0.002^\circ C$ . A dynamic comparison of the characteristics of two types of discriminator valve will be demonstrated.

As part of the NPL programme for improving the accuracy with which pressure may be determined with a mercury barometer, particularly for the establishment of  $100^\circ C$  on the International Scale of Temperature, the density of mercury can be determined to an accuracy of 1 p.p.m. by direct reference to mass and length. In one method the mass of mercury displaced by a 9 cm. tungsten carbide cube is measured. The geometric form of the cube, unique in its approach to perfection, has permitted its volume to be assessed to 1 part in 5,000,000 (standard deviation) from interferometric measurements of length. It weighs 10 kg. in air but about 200 g. in mercury. It is understood that work is proceeding on a second method which uses a hollow cube made up of optical flats of fused silica.

The **Road Research Laboratory**, Harmondsworth, will show a constant tensile stress viscometer which applies a tensile stress to prismatic specimens of highly viscous fluids. Stress on the specimen is kept constant as extension proceeds by a specially designed cam. For Newtonian liquids a coefficient of viscous traction can be calculated: it is three times the shear viscosity.

A polarographic dissolved oxygen recorder will be featured by the **Water Pollution Research Laboratory**, Steven-



Ultrasonic cleaning equipment (type 413) by Dawe Instruments



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age, Herts. In this record polarographic currents, reproducible over long periods and of about ten times the usual value, are given by a wide bore dropping mercury electrode (0.8 mm. ID) pointing upwards at about 45° and kept at -0.5 V with respect to a pure zinc electrode in a buffer of pH 5.5 separated from the water under test by a sintered glass disc. Direct recording of dissolved oxygen is made possible by automatic compensation for the effect of temperature on the polarographic current. Satisfactory operation of this equipment in extended trials in various waters is claimed. (34).

### Potentiometer and Titrator

Two instruments to be shown by **Doran Instrument Co. Ltd.**, 'Parklands,' Stroud, Glos. are the Wenner potentiometer and the Titratvit. The potentiometer has been designed for making precise measurements of low voltages, particularly those obtained from thermocouples. Special features are the omission from the measuring circuit of all switch contacts other than the galvanometer keys and special precautions to eliminate thermal e.m.f. as far as possible. The two ranges provided cover from 0 to 0.11111 volt and 0 to 0.011111 volt with an accuracy to 0.1 per cent  $\pm 0.1$  microvolt. The standardisation is carried out in the usual manner against a Weston normal standard cell and two decade switches are provided to enable standardisation to be made to within 10 microvolts of the standard cell voltage over the range 1.01800 to 0.0196 volt. The unknown e.m.f. is read on five decade dials and is given by the sum of the dial readings. Measuring resistors are housed in a lagged metal chamber so that they are substantially at the same temperature. Resistors and interconnections are of manganin.

The principle on which the Titratvit operates is that of 'polarised electrodes,' and has been the subject of research by Professor J. E. Dubois and Mr. Walisch of the Université de la Sarre. The electrode system is simple and robust, and the instrument may be used for a wide variety of titrations in aqueous, non-aqueous, or organic media, with strong and weak concentrations. Automatic titrations may be made by means of an electronic relay and an electromagnetically operated burette. (77).

### Fluid Density Gamma Gauge

A wide range of electronic and nucleonic equipment will be displayed on the stand of **Ekco Electronics Ltd.**, Southend-on-Sea.

Measurement of the specific gravity of a liquid is effected by the new Ekco type N611 fluid density gamma gauge. A caesium<sup>137</sup> gamma ray source is mounted on one side of the pipe containing the liquid, and a pressurised ionisation chamber on the other, output from the measuring head being measured by a type N565 indicator unit.

A direct reading of resistance values between  $10^7$  and  $10^{14}$  ohms, to an accuracy of 5 per cent or better is given by type N535 high resistance meter designed in conjunction with the Atomic Energy Research Establishment. Additionally, a comparison may be made between the values of two resistors, provided their resistance ratio does not exceed about 200:1. Voltages of 1, 10 or 100 may be applied to the resistor under test.

Developed for counting low energy beta particles, the new Ekco N612 beta scintillation counter is useful for the assay of C<sup>14</sup> and tritium. The source may be dissolved directly into the liquid phosphor or, should the source be contained in a liquid immiscible with phosphor, solution may be effected by the addition of a third substance such as methanol. Overall counting efficiencies of 60 per cent and more are obtainable with carbon 14 at room temperatures.

There will also be a display of Ekco thallium-activated sodium iodide crystals which are suitable for gamma ray counting and spectrometry applications. (33).

### Vacuum Pumps

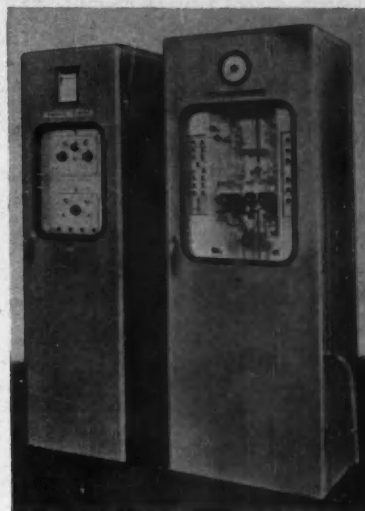
A range of vacuum pumps will be shown by **Edwards High Vacuum Ltd.**, Manor Royal, Crawley. Among them is a high speed 24 in. diameter four-stage fractionating diffusion pump with built-in backstreaming control device which is suitable for extracting high vacuum duties on nuclear machines as well as for regular industrial usage on large coating plant. A four-stage vapour booster pump, planned for production is designed to give high speeds over an extensive pressure range.

A new method of backstreaming control involving the establishment of suitable temperature gradients down the top jet cap, such that those elements of the vapour jet which would normally have 'backstreamed' are condensed out and cooled sufficiently to have negligible vapour pressure before they emerge under the cap will be demonstrated.

Another exhibit will be a vacuum gauge for condensable vapours. Based on a mercury 'U' tube manometer, with an integral electrical heating element maintaining a temperature of 50°C, it can be used on vacuum systems with water vapour pressures in the range 0.5 to 90 mm.Hg without condensation difficulties. (112).

### An 'Automatic Chemist'

Most prominent feature on the stand of **Electronic Instruments Ltd.**, Lower Mortlake Road, Richmond, Surrey, will be the new Titromatic analyser which is intended for continuous analysis in a chemical plant. The sample to be analysed is by-passed from the main stream at pre-determined intervals, is diluted with water and is then titrated against a standard reagent until neutralisation is complete. A photo-electric reader seeks the level of the reagent in the burette, and in



*Titromatic analyser by Electronic Instruments*

so doing, records the quantity used on a chart. The time interval between titrations can be adjusted from 5 to 30 minutes and the accuracy obtained is equivalent to manual titrations carried out by a skilled chemist.

There are two separate cabinets. One houses the chemical unit and the second contains electronic control equipment, consisting of a stable pH meter and a sequencing unit which determines the timing and order of operation of the taps in the chemical unit. Both cabinets are sealed against chemical fumes and can be pressurised. The Titromatic analyser is automatic in action and is designed to work continuously night and day, with only a weekly maintenance check.

Another new instrument designed by this company is a direct reading fluorimeter having a high degree of sensitivity. It can detect reliably two parts in  $10^{10}$  of quinine in solution. Samples can be examined in quick succession and decay of fluorescence in samples can easily be followed.

Several new applications of the Vibron electrometer are shown—a current and resistance measuring unit, and a new pH accessory unit converts the Vibron electrometer into a highly accurate and sensitive pH meter, giving a full scale deflection of 0.1 pH over the major portion of the pH range and enables readings to be made to an accuracy of 0.001 pH. (97).

### Omegatron Leak Detector

Divisions of **Elliott Brothers (London) Ltd.**, Lewisham, Rochester, Borehamwood and Weymouth, exhibiting this year are: computing, industrial weighing, microwave, research, servo components, guided weapons, radio and radar.

The industrial weighing division will show a new series of resistance strain-gauge load cells, comprising high-tensile steel members carrying bonded resistance wire strain-gauges, and a built

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in hermetically-sealed shells tested to 60 lb./sq. in. water pressure. Sensitivity is 2 mV out-of-balance output per volt input to the bridge for capacity load, and the cells are available in a wide range of ratings.

An Omegatron designed by the research division will be shown. It is a simple instrument for detecting the presence of ions of a particular mass and can be used for leak detection as an alternative to the more conventional mass spectrometer type of detector. (108).

### New EEL Instruments

Interesting new EEL instruments on show by **Evans Electroelenium Ltd.**, Harlow, Essex, are the EEL fluorimeter which is designed for the measurement of adrenaline and vitamin assays, a prototype of this new device will be demonstrated. Main application will be in the medical field but it will also prove useful in the food and pharmaceutical industries.

This compact instrument employs two 9-stage photomultiplier tubes in a sensitive opposition circuit. The null-point is shown by a robust galvanometer mounted within the case and the reading is presented on a precision engraved dial having an effective scale length of 10.5 in. The sample holder accommodates three sample cells for standard, unknown and blank, and can be supplied for either rectangular cells or selected test tubes.

A recently introduced device for the measurement of fluorescent bleaches is the EEL fluorescent-light meter. It has applications in the paper and textile trades, for with the increasing use of fluorescent bleaches to increase apparent whiteness a means for measuring the results obtained is essential. (47).

### Crystal Growing Technology

A static exhibit of crystal growing technology and evaluation will be featured by **Ferranti Ltd.**, Hollinwood, Lancs. Ferranti semiconductor devices are at present confined to silicon diodes and rectifiers of high efficiency and exhibits will show various applications. These applications illustrate the silicon signal diode in working circuits with special reference to the latest developments in high speed switching and reference diodes. Rectifiers of small dimension for up to 30 amps rectified current will also be shown.

Various ceramic seals suitable for use in valves, cable terminations etc., will be displayed. These seals are fully vacuum tight and will operate at high temperatures. (31).

### Electrophoresis Equipment

Several new exhibits will be shown by **A. Gallenkamp and Co. Ltd.**, Sun Street, London EC2. A horizontal and a vertical type paper strip electrophoresis tank connected to a power pack suitable for general use, will be demonstrated. The horizontal tank No. 4620 incorporates features which largely overcome non-electrophoretic influences. By

means of a virtually airtight lid, and by surrounding the strips with buffer-soaked paper, evaporation is reduced to a minimum. Capillarity is eliminated by exact levelling of the tank and its contents by means of a siphon channel. An easily manipulated strip carrier obviates the need to handle the strips unduly. The tank may be fitted with any of three electrodes, platinum, silver chloride or carbon, and these are fully interchangeable. The silver electrode is of an original design and is very simple to prepare. Use of vertical tank No. 4622 avoids excess surface moisture on the paper. Seven paper strips can be run consecutively. Twin outlets allow two tanks to be worked simultaneously.

A semi-micro apparatus for the determination of chlorides, based on a method published by Professor E. J. King and Dr. I. D. P. Wootton, in 'Micro-analysis in medical biochemistry' has been produced. The chloride content of as little as 5 ml. of solution can be determined using standard silver nitrate solution.

An adiabatic water jacket for bomb calorimeter has been designed. No heat transfer takes place between the jacket and the calorimeter and there is no need for the lengthy and complicated calculations entailed when static or isothermal jackets are used. Total time for a determination is reduced and the apparatus is particularly useful where routine measurements have to be made on large numbers of samples. (100).

### Chromatographic Apparatus

**Griffin and George Ltd.**, Ealing Road, Alpertown, Wembley, Middlesex, will exhibit the Griffin VPC gas-liquid chromatographic apparatus Mark II. Analysis by this apparatus is said to be fast, easy to operate, and has an accuracy comparable with that obtained by any other method. Organic compounds in the boiling range 0-300°C and of varying complexity, from  $C_1$ - $C_{22}$ , have been analysed both qualitatively and quantitatively.

A novel type of centrifuge, the Griffin Autopose centrifuge, has a self-balancing head and a rotating system which includes the bowl as well as the centrifuge head. The motor frame is resiliently mounted to allow a limited lateral freedom of movement to the rotating system, which is free to align itself about the axis of dynamic balance with a resultant relief of side thrust on the motor bearings. No precise static balancing of the centrifuge is necessary.

For use in the direct measurement of the force on a conductor carrying a current in a magnetic field there is the new self-contained Nivoc force-on-a-conductor balance. (40).

### GEC Developments

Research laboratories of the **General Electric Co. Ltd.**, Wembley, Middlesex, will display examples of recent developments in semiconductors, cathode-ray tubes and photoconductive cells together with a high-speed recording telepyrometer, and equipment for examining the

electrical and magnetic properties of ferrites.

The semiconductor display will include a large single crystal of germanium, weighing over 1 kg., and a single crystal of silicon, plus a range of semiconductor devices and a demonstration of applications.

Instantaneous temperature of molten glass in a  $\frac{1}{2}$  second can be measured by the photoelectric high-speed recording telepyrometer which will record the temperature to an accuracy of  $\pm 1^\circ$  within the range 900°C to 1200°C.

Three methods for the investigation of the properties of ferrite samples will be shown two of which involve the use of resonant cavities and the other an impedance measurement.

Quantitative determination of the composition of mixtures of rare gases by electrophoretic separation will be demonstrated. The length of the cathode discharge in a tube containing a mixture of two gases is directly related to the concentration of each. It is stated that even with simple measuring apparatus, the proportion of a given gas can be estimated over the range of 1 part in 10,000 up to 1 part in 50, when the total gas pressure is a few millimetres. (25).

### Infra-red Spectrophotometer

The H 800 double-beam recording infra-red spectrophotometer produced by **Hilger and Watts Ltd.**, 98 St. Pancras Way, London NW1, will be shown with two new attachments, both of which can be fitted to the standard instrument. The first is a reflecting microscope which makes it possible to examine such small samples as single fibres. The image is one-tenth actual size, but a 10 $\times$  enlargement is given to the image of the sample projected on the slit of the monochromator. The second attachment is for measuring and recording the infra-red reflectance of a sample relative to that of a chosen standard.

The Uvispek spectrophotometer now has an atomic-absorption attachment. It can thus be used to analyse certain solutions by an atomic-absorption technique. The sample solution is sprayed from an atomizer into a flame, through which passes the light of a hollow-cathode lamp emitting the radiation of the element to be determined. The absorption due to the element is measured at the appropriate wavelength.

Also to be exhibited is the prototype of a newly designed electrophoresis apparatus. The instrument is of console form and is linked to a separate refrigeration console by Shandon, which provides the coolant and facilities for dialysis and preparatory cooling of samples. (109).

### Gamma Ionisation Chamber

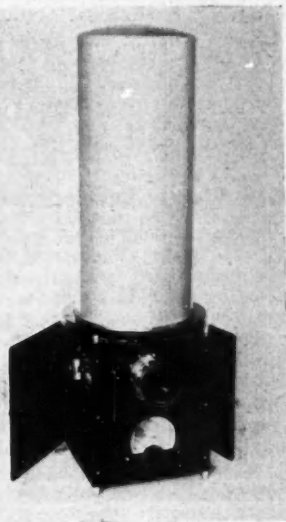
Developed in collaboration with the Atomic Energy Research Establishment, Harwell, the large gamma ionisation chamber (type 1506B) to be shown by **Isotope Developments Ltd.**, Beenham Grange, Aldermaston Wharf, nr. Reading,



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is similar to the airwall (type 1506A) which illustrates the range of nucleonic reactor instrumentation on which the company is engaged. The chamber operates at atmospheric pressure and delivers a current of  $6 \times 10^{-12}$  amp at a dose rate of 10mR/hour. This will be demonstrated.

Also to be displayed is the fast response beta gauge 170, which is a non-contacting thickness gauge for sheet materials. With an accuracy (including statistical deviations) within 0.4 per cent and a response time of better than 1/100 of a second. At the heavy end of the usable range, the accuracy is within 0.25 per cent



*Isotope Developments' airwall chamber*

with a response time of 1/20 of a second.

Gamma reflection gauge (190) covers thickness measurement in the range 200 mg/cm<sup>2</sup> to 2000 mg/cm<sup>2</sup>. Dependence on strip position relative to the unit is negligible within  $\pm \frac{1}{2}$  in. Novel collimation, self-calibration and radiation protection features are incorporated to give an overall accuracy to  $\pm 1$  per cent over the specified range. (6a).

### Automatic Densitometer

The new double beam 'Chromograph' automatic recording reflectance densitometer to be shown by **Joyce, Loeb and Co. Ltd.**, Vine Lane, Newcastle upon Tyne 1, is a successor to the semi-automatic version which has been in use for some years. Designed primarily for electrophoresis and chromatography analysis, the instrument has found a wide application in spot test analysis. Measurement of relative areas has been reduced to the counting of peak deflections of the integrator curve pen. (60).

### Pressure Capsules

Pressure capsules made of steel diaphragms welded together will be on display by **Kelvin and Hughes Ltd.**, New North Road, Barking. Stainless steel (including Ni-Span 'C') spring steel and

Nimonic alloys can be used in place of the traditional copper alloys.

These new welded, steel capsules largely overcome many of the limitations of the copper capsules. Improved strength of the joint enables higher differential pressures to be withstood; lower hysteresis may be attained; working temperatures may be considerably increased; low temperature errors can be achieved without bi-metal compensators. The capsules are almost flangeless, thus reducing waste space.

Several new miniature motors will be exhibited. (36).

### Chromatogram Scanner

**Labgear (Cambridge) Ltd.**, Willow Place, Cambridge, have developed an automatic chromatogram scanner D4129 and a count programme unit D4127. When the paper chromatogram scanning equipment is coupled with a printing counter, a completely automatic machine results.

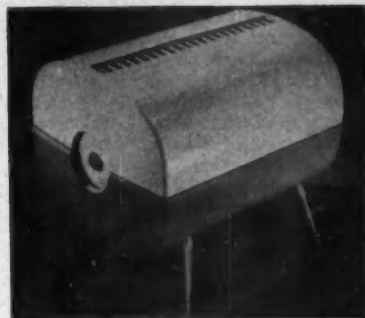
Paper chromatograms for investigation are fixed to standard film stock and wound on to a drum. This is fixed to the scanner and drawn under an end-window Geiger tube  $\frac{1}{2}$  cm. at a time. After each movement of the paper, the printing counter automatically prints out the number of counts that have been registered during the counting time which can be pre-set on the scanning device. An ingenious device avoids wasted counting time. Should less than three counts per second be omitted from a fresh paper area it will automatically be rejected, the drums rotated, and the next  $\frac{1}{2}$  cm. area drawn under the counting head. Several chromatograms can be fixed on the reel thus permitting a day's work to be counted and recorded overnight.

The count programme unit permits counting to take place for pre-set time periods at pre-set intervals, i.e. to count for ten minutes every half an hour, or, to count consecutively for any pre-set period.

A recording ratemeter D4123 will be shown operating with a newly-developed end-window type scintillation counter. This enables materials containing naturally radio-active elements or, alternatively, materials which have been tagged with a suitable isotope to be used as a measure of quality or quantity level in an end product. Controls can also be coupled to servo-mechanisms to enable automatic adjustment if complete automation is required. (19).

### Tubular Laboratory Furnace

New in the range of laboratory furnaces produced by **Johnson, Matthey and Co. Ltd.**, 73-83 Hatton Garden, London EC1, is a horizontal tubular furnace, type K 25 A. It is suitable for a wide variety of applications, such as combustion analysis, sintering and general metallurgical work. It can be supplied for use either up to 1,350°C or up to 1,500°C. The combustion chamber is 15½ inches long and 1½ inches in



*Tubular laboratory furnace by Johnson, Matthey and Co.,*

ternal diameter. At operating temperature the furnace consumes 800 watts at 105 volts. (94).

### 'Potted' Selenium Cells

Shown for the first time by **Megatron Ltd.**, 115a Fonthill Road, London N4, will be 'potted' selenium cells with soldered electrodes cast air tight into araldite. This process is the result of research and development work and is said to ensure complete protection against chemicals, contamination in the atmosphere, moisture, and constitutes perfect tropicalisation.

Also on display will be a colour temperature meter which requires one single measurement. Readings are independent of the light intensity over a very large range. (49).

### Square Wave Polarograph

Among models to be shown by **Mervyn Instruments**, St. John's, Woking, is the Mervyn-Harwell square wave polarograph. In its latest form, this instrument is suitable for the determination of still smaller quantities of minor alloying constituents in metallurgical analysis. At the maximum sensitivity, the new polarograph will provide a charge deflection of 1 mm. for an impurity content of less than 1 part per thousand million and will effectively deal with trace elements even in the presence of minor constituents in ratios of 20,000 to 1.

It is said that concentrations of cyanate and thiocyanate in effluents can also be measured continuously with a high degree of accuracy. Sulphur dioxide can be determined in the atmosphere down to parts per hundred million.

A further prototype of the Mervyn heavy water analyser will also be shown. Other exhibits include: Mervyn NPL infra-red spectrometer, spectrometer amplifier, large area alpha scintillation counter, and Midas (Mervyn instruments date analysing system), which has been re-engineered since the 1956 exhibition. (96).

### Ministry of Supply Exhibits

Six Ministry of Supply Establishments will provide twenty-two displays at the exhibition; in fact, the Ministry will be the largest exhibitor.

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To be exhibited by the Royal Aircraft Establishment is a non-linear spring system which will be demonstrated, among other things, as a spring balance for detecting small weight variations. The accuracy obtained is stated to be comparable with that of a knife edge chemical balance. (2).

The Armament Research and Development Establishment will also be demonstrating an apparatus for measuring the visco-elastic properties of materials. A new testing instrument has been developed to study the mechanical behaviour of thin scales or lamellae of materials under conditions of flow ranging from continuous movements to cracking up and rupture.

An oscillating spectrograph for X-ray fluorescence analysis will also be demonstrated by this establishment. Specimens of the elements from potassium to uranium may be analysed non-destructively with an exposure of less than one hour by the use of this equipment and an external X-ray source.

Analysis by a stationary wide-angle spectrograph will also be shown. In this apparatus the specimen is mounted close to the analysing crystal so that the fluorescent radiation can reach the crystal from a wide range of angles of incidence. Oscillation of the spectrograph is not necessary so that the apparatus is greatly simplified. There is also a gain of up to ten times in recording speed, though this is at the sacrifice of line/background ratio. (4).

### Electron Microscope

A prominent exhibit by **Metropolitan-Vickers Electrical Co. Ltd.**, Trafford Park, Manchester 17, will be a type EM6 electron microscope, giving direct magnifications ranging from 1000X to 100,000X. A mass spectrometer, type MS6L, will also be shown; this equipment has been specifically designed for the detection of gas leakages in pressurised or vacuum system. Its sensitivity in vacuum systems is such that it will detect leaks corresponding to the passage of 1 cubic centimetre (at atmospheric pressure) in 30 years.

Other exhibits will include an electronic analogue simulator; a display showing the effects of electronic irradiation on plastics and pharmaceutical products; a Metrovac coating plant for surface treatment of glass and metals; a Klystron valve as used for linear accelerators; equipment for detection of rolling defects in sheet steel; a Newton Victor 'Raymax 60' X-ray diffraction unit; a wide range of Metropolitan-Vickers pumps, valves and gauges for high vacuum plant. (115).

### Refractory Metals

Most recent developments in the fabrication of the refractory metals will be displayed by **Murex Ltd.**, Rainham, Essex. Niobium sheet, rod and drawn tube are now available for industry and will be of particular interest to those engaged in research on nuclear energy projects.

Beryllium metal sheet and beryllia

crucibles and thermocouple sheaths are being exhibited by the courtesy of the UKAEA. This metal is of particular interest owing to its low nuclear absorption cross section.

A tantalum bayonet absorber column for hydrochloric acid will be shown, and also tungsten and molybdenum fabricated parts available for many applications, including high temperature vacuum furnaces. (35).

### New Type Cast Iron

A new kind of cast iron, S.G. iron, in which the graphite is in the form of spheroids instead of the more usual flakes, can be examined on the stand of **The Mond Nickel Co. Ltd.**, Thames House, Millbank, London SW1. S.G. iron can be cast as ordinary cast iron, but is stronger, tougher and stiffer. (39).

### Plastics Scintillator

Further additions to the range of scintillators made by **Nash and Thompson Ltd.**, Oakcroft Road, Chessington, Surrey, will be shown including thallium-activated sodium iodide and a new plastics scintillator which has an extremely large pulse height relative to pure anthracene, coupled with an extremely short decay time.

A water hardness monitor has been developed in conjunction with the Central Electricity Authority and is intended for industrial boiler-house control purposes. The instrument sounds an alarm or initiates the recharging cycle of a water softening set when the total concentration of water hardness salts exceeds a preset figure. This can be as low as five parts per million or even less.

The instrument has other applications within the same field in both laundering and dyeing processes and may well prove to be the basis of a variety of chemical reaction controllers. (23).

### New Range of Balances

Analytical balances by **L. Oertling Ltd.**, Cray Valley Road, St. Mary Cray, Orpington, Kent, have been completely redesigned and a new range of 15 different models is now available. New features are balance beams of new shape and material enabling a new standard of weighing performance to be set. The beam and other essential operating parts are enclosed separately from the weighing compartment. A newly designed press bar control rapidly operates the release mechanism. Two-pan and one-pan balances are included in the range. (15).

### Automatic Counting Equipment

A variety of new instruments is being shown by **Panax Equipment Ltd.**, 173 London Road, Mitcham, Surrey, such as the automatic counting equipment—type A.C.300/5 for use with Geiger or scintillation counters incorporating a stabilised e.h.t. supply, preamplifier and discriminator. Facilities are provided both for

timing against preset count and for counting against preset time.

An overriding signal is provided to terminate the operation should either the time or count display be filled. The scaling circuits use plug-in dekatron units throughout. The count can be preset to  $10^2$ ,  $4 \times 10^2$ ,  $10^3$ ,  $4 \times 10^3$ ,  $10^4$ ,  $4 \times 10^4$ ,  $10^5$  counts and the timing interval can be preset to 1, 4, 10, 1,000, 4,000 or 10,000 seconds.

There is a scintillation counter of compact and flexible design for the counting of both liquid and solid samples A  $1\frac{1}{2}$  in. thallium-activated sodium iodide crystal is used mounted in a hermetically sealed container.

Transistor operated instruments which were shown in development form last year have been improved and the production versions are now available. Portable monitors types TR56 and TR33 are of pocket size and weigh only 3 lb. (64).

### New Plessey Developments

A number of components and instruments, now under development for industrial and scientific use, will be exhibited by the **Plessey Co. Ltd.**, Roke Manor, Romsey, Hants. For use at high temperatures, a wide range of metal-ceramic and other materials has been developed and classified under the group designation Cascermet.

A possible application is in the blades of ultra-high-temperature gas turbines now under consideration.

Plessey humidity elements have been developed primarily for use on radar-sondes but can be applied to many industrial processes. Elements of the sprayed layer type, for use where long term stability is not the first consideration, and the self-supporting film grade, for stability rather than rapidity of response, are to be shown.

Casonic III is stated to be in increasing demand in industrial ultrasonic cleaning processes and large area plates and trough transducers have been produced to exacting specifications.

To illustrate the use of precision resistive elements, a liquid-level control system has been set up which demonstrates the versatility of the special moulded tracks. A large arc-shaped track, having a total resistance of 20K ohms, forms a control potentiometer by means of which the equilibrium level of the liquid can be preset. (28).

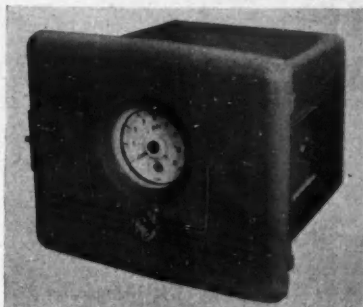
### Sulphur Content Determination

Among new instruments developed by **W. G. Pye and Co. Ltd.**, Granta Works, Newmarket Road, Cambridge, is a liquid density indicator designed to provide means for continuously recording and controlling density of liquids in an industrial plant. Basic measurement is obtained by a hydrometer float whose displacement is detected by a pick-up head producing a proportional electrical signal.

Equipment which has been developed in co-operation with one of the leading oil companies is an automatic determina-



## PHYSICAL SOCIETY

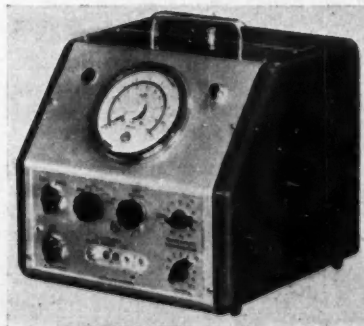


Pye's new industrial amplifier

tion of sulphur content apparatus. A sample is moved down a combustion tube mounted in a special furnace which produces a temperature gradient along the length of the tube. At certain temperatures the sulphur in the oil burns to sulphur dioxide which is fed to a titration cell. Here detecting electrodes and a pH meter millivoltmeter actuate Pye automatic titrators which control the addition of an iodine reagent from a burette until all the sulphur dioxide has been absorbed. When equilibrium is reached, the sample is moved again until gas at the next temperature region at which sulphur dioxide is evolved is reached. At the end of the run total sulphur content can be determined directly from the total volume of titrant added.

Many refinements have been built into the new Pye master pH meter, No. 11068 to provide the utmost stability, accuracy and convenience in use. A development of the Pye Universal model, it incorporates the following advantages: scale cf 0-14 pH is 11 in. long; scale overlap is 6 pH units, permitting titrations over a wide range of pH change to be made without alteration of the range switch; full automatic temperature compensation is provided; measurements can be made in either earthed or unearthened solutions; wide buffer range allows any type of electrode assembly to be used.

Newly designed is the Pye industrial amplifier, Model 'H.' The pH reading is indicated on an 8 in. circular scale and the range covered can be arranged to suit the application. Full automatic temperature compensation is provided, the temperature sensing element being the



Redesigned master pH meter

platinum resistance thermometer in the electrode assembly.

To enable users to make up gas liquid chromatography apparatus to suit their own particular application, a katharometer, a thermostatically controlled container, a control unit and a d.c. amplifier are available as separate items. (75).

### Self-balancing Infra-red Gas Analyser

To meet a growing need in the chemical industry for a null-balance gas analyser, Sir Howard Grubb, Parsons and Co. Ltd., Optical Works, Walkergate, Newcastle upon Tyne 6, have designed a self-balancing infra-red gas analyser. The infra-red source is totally enclosed, there is immunity to vibration, and remote recorders or controllers are operated electrically or pneumatically. A demonstration of the prototype instrument will be given. (71).

### Compensated Thermobalance

A pre-production version of a fully compensated thermobalance having interchangeable furnace units will be shown by Stanton Instruments Ltd., 119 Oxford Street, London W1. The design is stated to allow for a greater output from a single balance and for the 'blank' to be run simultaneously with the sample. The continuous 'change in weight' curve obtained is compensated for buoyancy automatically.

A high temperature version of the standard thermobalance having a bifilar wound platinum furnace for use up to 1,420°C will also be exhibited and will be used to demonstrate the measurement on samples in a gas atmosphere. (74).

### Colour Measurement

Two new colour measuring instruments will be featured by the Tintometer Ltd., Waterloo Road, Salisbury, with additions to the firm's range of colour standards for use with the Lovibond comparator.

Lovibond Schofield Tintometer, type 2, is a visual colour measuring instrument based on the Lovibond permanent glass series of subtractive primaries red, yellow and blue. It incorporates a new obturating device for brightness control and measurement and a high wattage lamp improves discrimination of small colour differences between dark samples. Readings can be converted to the x, y, z values of the CIE system of colour specification.

The new Lovibond portable hand Tintometer, originally designed for measuring the colour of skin, is suitable for many measuring problems where it is more convenient to take the instrument to the sample.

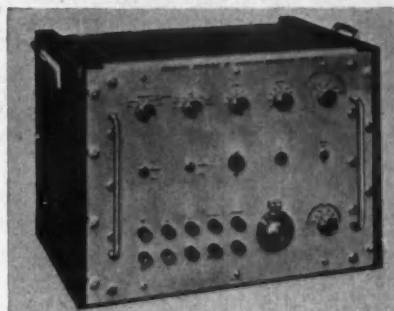
Lovibond double comparator has been developed for factory production control. There an operative has to work to a colour between two limits during the preparation of oils, varnishes and liquids. This instrument enables the two

colours and the sample to be viewed at the same time.

The company has also developed new comparator discs for the estimation of humidity. Special thin cellulose 'condenser tissue' has been impregnated with cobalt thiocyanate (0.55 mg. anhydrous CO (CNS)<sub>2</sub> per sq. cm.) for use with these discs by British Drug Houses Ltd. (83).

### LF Waveform Frequency

At last year's exhibition, Servomex Controls Ltd., Crowborough Hill, Jarvis Brook, Sussex, showed a prototype low frequency waveform generator type LF51 designed for testing automatic control systems. The final version is so much different from the prototype that it is virtually a new instrument. It can be used directly in the case of electric systems and for pneumatic systems suitable electro-pneumatic converters are



Servomex low frequency waveform generator

available. The LF51 used in conjunction with a converter is stated to be a much cheaper proposition than a specially made pneumatic generator.

The range of frequencies from the LF51 extends from 1 cycle every 33 minutes, which is slow enough for most chemical process controllers, up to frequencies higher than any that have been reached or are likely to be reached in the type of servo systems used in guided missiles. The fastest test signal is a pulse of 100μs duration.

Another new instrument that will be shown will be the DC voltage regulator DC56 which breaks new ground in the field of low voltage high current, being rated at 3-30V 0-40A. (51).

### High Purity Quartz

Specially pure grades of fused quartz for use in the preparation of semi-conductor materials have been developed by The Thermal Syndicate Ltd., Wallsend, Northumberland. Examples being shown include tubes, crucibles and thin-walled boats.

To meet the need for materials that provide inert bases at high temperatures on which catalysts may be deposited, examples of pellets and short multi-bore sections in porous alumina and magnesia will be displayed. These materials are intended for use in the 1,500-2,000°C range. In addition, there is a platinised

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quartz wool suitable for lower temperatures in the range of 900-950°C.

Low porosity zirconia and thoria crucibles are stated to be proving useful for high temperature metal melting in vacuo or in oxidising conditions—thoria up to about 3,000°C and zirconia to about 2,400°C.

Vitreous immersion heaters have never been recommended for prolonged use in alkaline solutions, but to overcome this difficulty heaters with sheaths of aluminous porcelain 525 ware, which has given satisfactory results under test in alkaline solutions, are being developed. (53).

### Automatic Balance

Shown by **J. W. Towers and Co. Ltd.**, Victoria House, Widnes, will be the Shell-Towers automatic standard distillation apparatus, a development of a unit produced mainly for use in chemical plant and refinery control.

The Towers portable CO, CO<sub>2</sub> conductivity meter, designed by the ICI Billingham division to estimate the content of CO, CO<sub>2</sub>, SO<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub> and O<sub>2</sub> in gas samples over the range of 5-100 p.p.m., will also be shown.

Another interesting exhibit will be Towers 205 direct reading automatic balance of 200 g. capacity and 0.1 mg. sensitivity. A single pan constant load balance, it eliminates beam length errors, reading errors and errors due to worn or corroded weights. All the non-magnetic stainless steel weights are operated from outside and the load on the beam is always brought to 200 g. by removing weights equal to that of the sample. Planes are of synthetic sapphire and the knife edges of synthetic ruby.

An automatic fraction collector for use in chromatographic analysis is also to be displayed. (46).

### Moisture Testing Balance

New and redesigned equipment will be exhibited by **Townson and Mercer**

**Ltd.**, Croydon, Surrey. In its early prototype stage is the vacuum infra-red moisture testing balance which uses a beam of infra-red light, in vacuum, to dry the sample. By this means, drying times can be accelerated without overheating the samples. Preliminary experiments indicate that it is likely to be of great interest for many laboratory tests.

The newly designed X.27 major thermostat bath embodies a new type of straight line liquid circulation and is designed to give accuracies more than twice as good as normal glass sided baths. A wide range of temperature control with accuracies of  $\pm 0.005^\circ\text{C}$  can be obtained in what is a relatively low priced bath.

Of particular interest for carrying out operations in inert or dust-free atmospheres is the flexible glove cabinet. It is welded entirely from p.v.c. sheet, including the gloves, with the result that it can be treated as expendable for many processes where the expensive rigid glove cabinets are not practicable.

The diaphragm plastics burette tap has now been redesigned for moulding and the price is said to be below that of equivalent glass taps. Control and freedom from sticking are notable features. (57).

### Chemical Measurements

Demonstrations will be given by the **Wayne Kerr Laboratories Ltd.**, Roebuck Road, Chessington, Surrey, to show the use of the transformer ratio-arm bridge to measure the conductivity of liquids without the use of electrodes. Both comparative and absolute values of conductivity within the range  $10^{-1}$  to  $10^{-9}$  mhos/cm. are possible. Conductivity measurements of a liquid flowing in a pipe will also be shown, again without the use of internal electrodes.

A further demonstration will illustrate the wide range of dielectric constant measurements possible using this type of bridge. The method is demonstrated at audio frequencies with both solid and liquid dielectrics.

Exhibits and demonstrations will give

further examples of the advantages to be gained by the use of cold casting resins for very high voltage insulation where limitation of space is the primary consideration. Of particular interest will be the improved performance obtained by the use of new polyester and epoxy resins for miniature high voltage components. (79).

### Ultrasonic Flaw Detector

Ultrasonic flaw detection equipment will be displayed by **Ultrasonoscope Co. (London) Ltd.**, 47c Sudbourne Road, London SW2. Equipment, already extensively used in the metal industry, is the ultrasonoscope MK.1A. Improvements have been made by the increased sensitivity obtained at 5 Mc/s. and lower minimum range (3/16 in.). Variable repetition rate giving increased brightness is installed. A trace delay unit is an optional accessory, and special line contact probes requiring no couplant are available for testing soft metallic materials.

An instrument developed by **BISRA** for the rapid detection of lamination in sheet metal by resistance variation is the Laminometer which is in expensive, portable and rugged. (56).

### Flame Photometer

**Unicam Instruments Ltd.**, Arbury Works, Cambridge, will be exhibiting the SP.900 flame photometer which is now a production instrument. It consists of a burner (for propane or acetylene) fed with an air supply (conveniently derived from compressed air bottles) in which the sample material has been finely dispersed by means of a concentric jet atomiser. Light from the burner, which shows a high degree of stability, is passed through a silica prism monochromator of high light-gathering power to a detector via a 100 c/s chopper. The detector output is amplified and synchronously rectified, and the resulting signal displayed as a direct reading of emission line intensity on a spot galvanometer having an open scale and a high speed of response. An alternative signal outlet suitable for operating certain standard types of recorder is provided.

A spectrofluorimeter is designed to allow irradiation of a liquid with monochromatic light of any desired wavelength within the range 220 m $\mu$  to 1,000 m $\mu$  and measurement of resulting fluorescent light at any wavelength within the same range. An excitation spectrum may be determined by measuring fluorescent light at any selected wavelength as a function of the wavelength of the exciting light, or a fluorescent spectrum at any selected exciting wavelength can be determined by measuring fluorescent light as a function of the wavelength of the fluorescent light. Replacement of the fluorimeter cell by a suitable prism converts the instrument into a double monochromator spectrophotometer for which standard cell compartment and cell carrier are incorporated. (81).



Chemical measurement with a Wayne-Kerr bridge 221. By courtesy of 'Scope'



# CHEMISTS AND THE COMMUNITY

## Hinchley Medal Address

**C**HEMISTS' SALARIES, education in technology, automation, management studies and the role of the older chemist—these were the main themes of the Hinchley Medal Address given on Tuesday evening this week by Mr. H. L. Howard, B.Sc., A.R.C.S., D.I.C., F.R.I.C., M.I.Chem.E. The medal, awarded annually by the British Association of Chemists, was presented to Mr. Howard by the president, Mr. G. T. Gurr, at the Royal Society of Medicine, Wimpole Street, London W1.

Mr. Howard began his address, entitled 'Chemists and the Community,' by paying tribute to the late Professor Hinchley, saying 'we did right to perpetuate his memory, for to him we owe a great debt as a pioneer and founder member of this association.'

Contrasting conditions of 30 years ago when the association was fighting to establish the right of chemists to reasonable notice of termination, with those of today, Mr. Howard said that fight was won in the courts and it was established that three months' notice was reasonable. During the first war, chemists were often paid less than workmen under their control; yet the idea of salary scales was anathema to most professional men. Today, more than 90 per cent of all professional men were remunerated on salary scales, most of which they had little or no say in fixing.

There were many today who looked on those battles as won and who felt they need not bother further. 'Nothing could be further from the truth', declared Mr. Howard. 'Eternal vigilance is necessary to safeguard these gains. There is more work ahead, which will strain the resources of this association to the utmost'.

### Service to Chemists

He acknowledged the work of many past and present members who served or who had served either as MPs, as members of local authorities, justices of the peace and many different committees. They were doing a service to chemists and the community in bringing their special knowledge to bear on many problems of special importance and more particularly in demonstrating that chemists were vitally interested in the use to which scientific discoveries were put.

'The idea that scientists are not interested in such matters is a myth that should be demolished with all the emphasis at our command'.

Chemists had much to contribute in the field of education. To most people, chemistry was still something of a mystery and there were many industries that were still governed by rule of thumb, industries in which science was regarded with suspicion. In those fields chemists could play an important part in showing how science could improve quality, eliminate error and explain results.

An essential feature of the scheme to upgrade some 24 technical colleges in an effort to increase the capacity of advanced courses in technology from 9,500 to 15,000 students, was the provision of sandwich courses. It might seem surprising that the City and Guilds with its extensive experience of technological awards was destined to play a minor role in that great scheme. Mr. Howard viewed with some misgiving the apparent failure to take advantage of that accumulated knowledge.

In any case, the scheme was doomed to failure unless firms and their highest technical staffs co-operated in facilitating release of potential teachers in specialised subjects. It was not always realised that technology was often ahead of science; the freshly graduated teacher who thought he could read up all the technology he required was due for a few shocks from virile technicians who were keen to get on.

### Automation

Referring to automation, Mr. Howard said that increased mechanisation and instrumentation would require more and more competent mechanics capable of building and maintaining such instruments and all those demands must fall on the diminishing numbers of the brighter lads.

Many chemists had proved themselves as competent administrators in industry. Now, however, there was a marked trend to bring in the specialist in time and motion study, materials handling and planning. In his experience, Mr. Howard had found that most of the innovations introduced by those people were precisely those innovations which the existing staff had demanded for years without effect. Unless chemists took note of those trends they were likely to lose their pre-eminence in management which they had striven to acquire over so many years.

Mr. Howard then referred to the tendency to lengthen the period at school and university, so that chemists entered industry at a substantially later age. There was also the tendency to brand any chemist over 40 years' old as potentially obsolescent and lacking in ideas. But there were thousands of posts which a chemist at the ripe old age of 40 to 50 could undertake without having to accept a derogatory position of restricted salary simply because of advancing age.

Many chemists holding senior positions could do much to mitigate this evil, reducing their demands on younger chemists to a minimum and giving positions to older men. 'It is noticeable', stated Mr. Howard, 'that in all salary statistics there is unmistakable evidence that older chemists are not receiving equivalent increments to what would have to be paid to attract fresh staff and some-

thing could be done to tip the balance more favourably'.

He welcomed the association's recent link with the newly formed Federation Internationale des Cadres de la Chimie et Industries Annexes, to which associations of chemists in France, Germany, Italy, Belgium and Switzerland were also linked. This new organisation was connected through the Confederation Internationale des Cadres with similar associations covering mining and metallurgy.

It was hoped that close co-operation would enable action to be taken at levels formerly out of the reach of BAC. If international peace was ever to be achieved and war banned, it would come about by the agency of such co-operation which transcended national boundaries and sovereign rights.

### Rising Scale for University Grants

IN A WRITTEN ANSWER, Mr. P. Thorneycroft, Chancellor of the Exchequer, announced the amounts of the Government's proposed grants to universities over the next five years.

The proposed grants will rise from £30.6 million in 1957-58 to £32.3 million in 1958-59, £34.35 million in 1959-60, £36.75 million in 1960-61 and £39.5 million in 1961-62.

The Exchequer has had to take into account the growing number of qualified applicants for admission to universities and the importance of universities' output of graduates at a time when the need for them was increasing and when the country's future required that it be kept in the forefront of scientific and technological development.

Also the financial and economic difficulties of the country which call for general restraint have had to be taken into account as well.

These sums of money to be granted do not include provision for non-recurrent grants towards capital expenditure and take no account of the recently announced improvements in academic salaries.

On 14 March the interim report of the University Grants Committee on university developments in the years 1952-56 was published as a White Paper (CMD. 79). It contains an account of the progress made with Government grants toward the recurrent expenses of universities.

### Higher Duty Sought on Organo-Siloxanes

An application for increased protective duty is being considered by the Board of Trade on: organo-siloxanes, whether polymerised or not; and mixtures containing 25 per cent or more by weight of such organo-siloxanes, but not cured or vulcanised products. Representations on this subject should be made in writing to the Board of Traffic traffic division, Horse Guards Avenue, London SW1, not later than 29 March.

### Will

MR. JOHN HALL FORSTER, founder of Hall Forster and Co. Ltd., manufacturing chemists, Newcastle, who died on 13 January, aged 83, left £48,988 net.

## RECORD CHEMICAL AND PLASTICS SALES BY CELANESE CORPORATION

**C**ELANESE CORPORATION of America, in its annual report to stockholders, reported net income after taxes for 1956 of \$16,863,224, equal to \$2.08 per common share after provision for preferred dividends. This compares with \$15,303,268 (including tax recovery of \$4,082,438) for 1955, equal to \$1.81 per share. The 1956 net income, before provision for federal taxes, amounted to \$23,063,224, compared with a 1955 pre-tax of \$19,720,830.

Net sales increased to \$188,307,250 in 1956 from \$177,502,026 in 1955 and, according to president Harold Blancke, represented improved performance by each of the company's operating divisions. Both sales and earnings last year were the highest since 1951.

Celanese textile sales reflected progress in achieving broader market coverage, increased development of new product end uses and improved co-ordination of marketing, production and research, the report stated. New developments and product applications cited include: Celacel, a special acetate staple fibre, Fortisan-36, a high-strength rayon.

Celanese plastics sales during 1956 were reported as the highest in history. New production facilities completed during the year at the company's Belvedere, New Jersey, plant increased capacity for cast acetate sheet and film. During 1957, facilities will be added at the Newark, NJ, plant for expanded production of extruded acetate film. Other Celanese plastics which achieved increased volume acceptance during the year include, Forticel, a cellulose propionate moulding compound and polyvinyl acetate emulsions, used in water-based latex paints.

### New Fortiflex Plant

Satisfactory progress is recorded regarding construction of a new plant in Houston, Texas, for production of Fortiflex, a new olefin polymer offering unusual rigidity, heat resistance and chemical inertness. End uses foreseen for this resin include bottles and containers, piping, and various industrial products.

Celanese chemical sales during 1956, like those of plastics, were also a record. The year's chemical operations were characterised by expansion and diversification, according to the report. Expansion under way in the company's Bishop, Texas, plant will increase by 25 per cent its output of formaldehyde, methanol, acetaldehyde and certain other organic chemicals. When in full operation later in 1957, the Bishop plant will be the world's largest producer of formaldehyde and the only commercial plant using the direct oxidation process in its production.

A new polyol unit at Bishop will produce trimethylolpropane for polyurethane plastics and foam rubbers in addition to components for alkyl resins, high quality brake fluids and other industrial products. During 1956, a new plant in Point Pleasant, West Virginia, began production of a new line of fire-safe hydrau-

lic fluids. The plant will also produce other speciality chemicals.

In the company's Pampa, Texas, plant, a new unit is being built to produce acrylate esters, which go into a broad range of end products including paints, plastics, adhesives, synthetic rubbers and finishes for paper, textiles and leather.

As a measure of the Chemical Division's growth and diversification, it is to be noted that approximately 40 per cent of its current sales volume comes from products introduced since 1949.

Export sales are also becoming increasingly important to the company, with Celanese products now being distributed in more than 50 countries, either by trade representatives or through affiliate companies, in Canada, Mexico, Colombia and Venezuela.

## US Work Confirms that Silver is the Most Potent Fungicide

**S**ILVER as a metallic ion with powerful toxic effects upon fungus spores is a theme that has received scanty attention in technological literature, writes a correspondent. Mercury and copper, and to a lesser extent zinc and cadmium, have had most of the limelight.

A new paper from the Boyce Thompson Institute for Plant Research may act as a forceful reminder that silver fungicides have been extraordinarily neglected. In the research reported (Miller and McCallan, *J. Agric. and Food Chemistry*, 1957, 5, 116), radio-isotopes silver-110, mercury-203, cadmium-115, and zinc-65 from Oak Ridge were used in comparative studies of metallic ion effects upon spores of five different fungi.

Claims that silver is the most potent fungicide of all metallic ions were confirmed. A feature of the action of silver clearly established in these new experiments was the speed with which silver ions were taken out of solution by spores in contact with silver salt solutions. Germination of the spores was completely inhibited after contact times of 1 minute or less. Mercury ions alone can offer serious competition to this speed of action—copper, cadmium, and zinc ions reduce spore germination appreciably only after some hours of contact.

Other radioisotope experiments using spores containing P-32 showed that silver's toxicity to fungi is associated with ability to upset spore cell permeability. With silver, large releases of cell contents occurred, up to 45 per cent of the phosphorus compounds in the spore cells being released when the spores were killed by heat treatment. Copper also had this effect but only after long contact times—zinc, cadmium, and mercury did not, indicating that their toxic effects upon spores are of a different nature.

It is usually desirable for a fungicide to be sparingly soluble so that its deposition on sites vulnerable to spore

## Seven Revisions to BS for Solvents, Plasticisers

REVISIONS of seven further standards in the series dealing with solvents, plasticisers and allied materials have been issued by the British Standards Institution. All the standards in this series issued between 1950 and 1951 are to be revised.

The revisions are: BS 509:1957, acetone; BS 549:1957, diacetone alcohol; BS 552:1957, amyl acetate; BS 574:1957, diethyl phthalate; BS 577:1957, hexachloroethane; BS 663:1957, ethyl lactate; BS 1595:1957, isoPropyl alcohol.

Changes in the specifications reflect improvements in the qualities of material now available. Considerable clarification has been achieved in the presentation of the analytical methods.

Copies of these standards may be obtained from the institution's sales branch, 2 Park Street, London W1, price 3s each, except BS 549 and 574, which are 2s 6d. each.

attack are persistent. The toxic effects of the insoluble silver halides were therefore examined. Combinations as chloride appeared to have no reducing effect upon the silver ion's toxicity, but combination as bromide reduced it and as iodide prevented it.

## Polythene Linings for Beldec Water Paint

ICI BELDEC water paint is now being packed into Alkapaks polythene bags made by the Paper Goods Manufacturing Co. Ltd., of Sutton. These bags are contained in drums of certain sizes.

This new method of packing, state ICI, has the advantage of helping to preserve the material and is more economical than the use of lacquered drums. Similar types of polythene liners are being used for metal pretreatment products and for certain paint intermediates.



Alkapaks polythene bag used for packing Beldec water paint.



## Overseas News

### CHEMICAL PROJECTS IN NORTH VANCOUVER HEADED BY HOOKER ELECTRO-CHEMICAL

ACCORDING to Robert L. Murray, chairman of the board of Hooker Electro-Chemical Company, the \$12,000,000 chemical plant being built in North Vancouver, B.C., by Hooker Chemical Company represents only the beginning of an expansion programme likely to be carried out by that and other companies in the area. The list of chemicals which will be produced in Vancouver areas as economic conditions justify, is expected to increase greatly, particularly since crude oil and natural gas provide new possibilities for expansion. If the demand for expansion is as great as anticipated, it will require the ploughing back of most of Hooker Chemical's profits for many years to come, Mr. Murray has stated.

Plant now being built by Hooker Chemical at North Vancouver will produce caustic soda and chlorine to serve the rapidly growing pulp, paper and plywood industries. The Hooker organisation, which has eight plants and a capital investment of \$124,000,000, produces a wide range of products, including plastics and synthetic rubber.

#### Scandinavian Nuclear Co-operation

The Scandinavian countries have accepted the Norwegian proposal that they should co-operate in the development of nuclear power for industrial purposes. A Scandinavian institute for the theory of nuclear physics is to be set up in Copenhagen.

#### Consumption of Fuel Oil by Italy's Chemical Industry

It is estimated that chemical industry in Italy will need 292,805 tons of fuel oil during the first half of 1957. This quantity exceeds the amounts required by such other major industries as steel and iron (288,577 tons), engineering (235,355 tons), and textiles (157,177 tons). In view of the Suez crisis, it is hoped to replace about 30 per cent of the chemical industry's needs in fuel oil by coal.

#### Ceylon Rubber and Plastics Research

A British-made laboratory rubber mill for experimental research into the development of rubber and plastics materials is to be presented to the Ceylon Institute of Scientific and Industrial Research.

#### Uranium Production in Japan

Experimental production of uranium metal is expected to be started next month in a pilot plant constructed by the Atomic Fuel Public Corporation at a cost of about £1 million. Later a refinery

with an initial capacity to produce three tons of uranium metal will be built. This refinery will be expanded as experience in uranium production and demand for the metal grows.

It is also reported that uranium deposits known to exist in Thailand are to be developed by the Komatsu Manufacturing Company. UK scientists are at present carrying out technical investigations on the value of these deposits.

#### High Temperature Grease Introduced by Bel Ray

A new high temperature, stable, non-melting complex grease, Belco 5016 Grease, has been introduced in the US by Bel Ray Co. Inc. The grease is described as containing micronised natural flake graphite, a gelling agent and a specially formulated non-carbonising oil with additives. It is guaranteed not to carbonise, harden or form any decomposition products, and is said to evaporate completely leaving only the pure graphite in the bearings.

#### Identification Colours For Gas Containers

Instructions have been issued by the Italian Ministry of Transportation to the effect that all cylinders used for transportation of compressed gases must be marked by means of a four-inch wide painted coloured stripe. These colours are as follows:

Acetylene ...	Orange
Ammonia ...	Light green
Carbon dioxide ...	Pale grey
Air ...	Alternate black and white
Nitrogen ...	Black
Cyclopropane ...	Orange (but with the name of the gas in letters)
Helium ...	Brown
Ethylene ...	Purple
Hydrogen ...	Red

#### Canada's Increased Use of Synthetic Rubber

The use of synthetic rubber in Canada reached a record 108.4 million lb. in 1956. This represents 44.8 per cent of all rubber used. In 1955, 90.1 million lb. (40.4 per cent of the total used) was used. Stocks of rubber at the end of December 1956 amounted to 47.13 long tons, 6,755 tons of synthetic and 1,589 tons reclaimed.

#### New US Insect Repellent

Soon to be available in commercial preparations in the US is a new liquid insect-repellent, diethyl toluamide. The compound was synthesised by the US Department of Agriculture and has been tested in co-operation with the US Department of the Army.

Tests have shown that the compound repels mosquitoes more effectively than

any other known type of compound or combinations of chemical repellants. It has proved to be particularly useful against several kinds of biting flies and is highly effective against fleas and ticks.

Diethyl toluamide, it is stated, can be safely applied to skin or clothes. It is non-staining, non-greasy, has a pleasant smell. One application lasts several hours.

#### Italy's Research Budget

A total of 2,135 million lire has been budgeted in Italy for the National Research Council. Out of this sum, 713 million lire will be spent on administration, personnel, library, fellowships, congresses etc, while the balance will be devoted to research proper. The chemical section will receive 185 million lire which gives it the third place after biology/medicine (245 million) and engineering/architecture (200 million).

#### Fertiliser Factories in Pakistan

Pakistan's Minister for Food and Agriculture disclosed late last month that one fertiliser factory with an annual production capacity of 50,000 tons had been set up at Dandkhel, and another with an annual production capacity of 6,000 tons, at Lyallpur. Both these factories are expected to go into production from April this year.

Ammonium sulphate will be produced at the Dandkhel factory and superphosphate at Lyallpur factory.

Two more fertiliser factories, one in each 'wing' of Pakistan, based on natural gas, with a capacity of 200,000 tons each, are being planned.

Under the ICA Aid Programme, the US contributed over \$12 million towards the external expenditure of the Pakistan American fertiliser factory at Dandkhel.

#### US and Surinam Bauxite Processing Agreement

It is reported that a preliminary agreement has been reached between the Government of Surinam and the Aluminium Company of America regarding the development of water power installations for the proposed processing of bauxite into aluminium. It is estimated that investments in connection with this project are of the order of 500 million Surinam guilders (Fls.1,000 million). Work on the installations should start in 1958.

#### Richardson-Bellows form European company

Formation of a new European company to manufacture and market Bellows air motors and 'controlled air-power' devices as well as Richardson materials handling equipment, control panels, and automatic scales is announced by the Bellows Co., of Akron, Ohio, and Richardson Scale Co., of Clifton, NJ, US.

Since 1952, Richardson Scale SA has maintained headquarters at Geneva, Switzerland, for the manufacture, sale and service of Richardson automatic weighing and proportioning equipment. The programme is now being expanded and includes a change in name to Richardson-

Bellows Sa, Geneva, Switzerland, as well as the manufacture and distribution of Bellows air motors and bellows 'controlled air-power' devices.

### Franco/Soviet Agreement

Under a new trade agreement, valid until 31 December 1959, French exports to the Soviet Union will include miscellaneous equipment for the chemical industry, laboratory instruments and equipment. Soviet exports to France will include crude oil, chrome and manganese ores, cellulose etc.

### Norwegian Tariff Changes

Included among revised rates of duty negotiated with GATT (General Agreement on Tariffs and Trade) countries by Norway are vinegar and acetic acid (Kr. 50 per kg., or *ad valorem*).

### New Peruvian Tariff Item

Phthalate butyl has been added to the Peruvian customs tariff with a specific duty of Soles. 60 per gross kilo; additional duty *ad valorem* is 13.667 per cent. Imports are also subject to a tax of 6 per cent on the freight value.

### Australia's New Steel Research Centre

Professor Howard Worner, professor of metallurgy at Melbourne University, will head the staff at the new steel research centre of the Broken Hill Co. Ltd. at Shortland, near Newcastle, NSW. Facilities provided will allow for chemical analysis, spectrography, X-ray diffraction etc.

### US-Japanese Polystyrene Plant goes on Stream

Production of polystyrene has begun at the new Kawasaki plant of Asahi-Dow Ltd., according to an announcement by Dow Chemical International Ltd. and Asahi Chemical Industry Ltd.

The plant, which was completed two weeks ahead of schedule and went 'on stream' on 20 February, is the second joint venture undertaken by Asahi Chemical Industry Ltd. and Dow Chemical

International Ltd., who joined to form Asahi-Dow Ltd. five years ago. The first products manufactured by the firm were saran and saran filaments, which are widely used in Japan's fishing industry as well as in other domestic industries.

Situated between Yokohama and Tokyo, the new Kawasaki plant received its first shipment of styrene monomer in January. This shipment was reported to be the first bulk shipment of monomer from the US to Japan and comprised 1,500 long tons.

### Danish Pyrolytic Gas Works

It is reported that A. P. Moller's pyrolytic gas works at Amager (see *CHEMICAL AGE*, 2 February, page 205) appears at last to have overcome its technical difficulties. Trial operations were begun again at the end of December and have continued satisfactorily. Deliveries of gas were expected to be begun first followed by those of ethylene, for the production of synthetic spirits.

### Titanium and Zirconium : Recovery from Scrap

A process for removing unwanted contaminating materials from scrap titanium and zirconium has recently been patented in the US by EI du Pont de Nemours and Co. Inc. and C. E. Rick (US Patent 2,773,787).

Details of the process appear to depend on mixing gallium, indium, or germanium with the scrap metal in quantities proportional to the amount of contaminant to be removed, followed by heating.

In the heating process the scrap metal plus the additives are heated in an inert atmosphere to a temperature of the order of 1,000°C until contaminating materials volatilise and are removed as compounds of germanium, indium or gallium.

It is stated that the process can be used to de-contaminate hafnium.

### High Density Polythene Laboratories Opened in US

Application and research laboratories of the polymer chemicals division of W. R. Grace and Co., New York, were opened at Clifton, NJ, on 7 March. Claimed to be the first laboratories in the country devoted to studies on high

density polythene, they have been licensed by the Phillips Petroleum Co. to make this new high density polythene, which imparts a stiffness and strength to a material normally expected to be soft or pliable.

Heat resistance characteristics of the new polymer were demonstrated to visitors on the opening day by placing cups made of each kind of material in boiling water. The cup made of conventional material lost its shape and was no longer useful after boiling for two minutes. The cup made of the new resin can be boiled indefinitely without changing its composition.

Clifton was selected as the site for the new laboratories because of its location in the heart of the plastics fabricating belt. Over 50 per cent of the plastics fabricators in the US are located in a 300 mile radius of the laboratories.

### Chilean Nitrate Plants May Close

Unfavourable conditions that have been affecting the Chilean nitrate industry for some time have become acute and some of the plants of independent producers on the Pampa de Iquique are expected to be closed shortly. A commission appointed last year to study the industry has completed its investigations and a report is expected shortly.

### Gas Chromatography Abstracts

Abstracts of 143 scientific articles published in the US and abroad up to July 1956 on gas chromatography are contained in a new bibliography published by the US Bureau of Mines, Interior Building, Washington DC.

### Mysore Laboratory Celebrates Silver Jubilee

Mysore Industrial and Testing Laboratory Ltd. celebrated its silver jubilee at Bangalore on 18 March. Those present included Dr. B. Venkatasubba Rao, chairman, and Sir A. Lakshmanaswamy Mudaliar, vice-chancellor, Madras University.

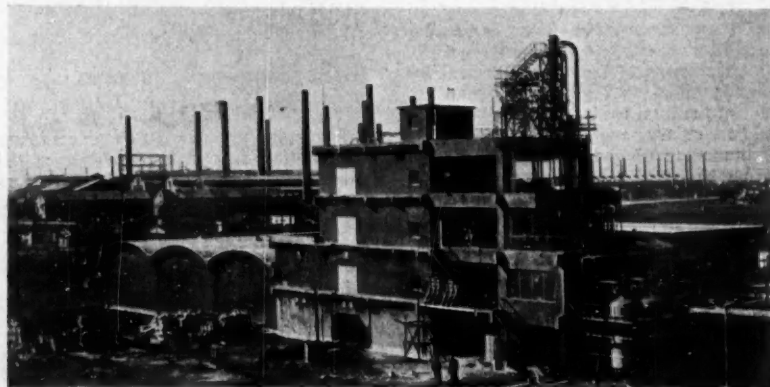
### Rhodesia's First Uranium

It is expected that the first uranium plant in the Rhodesian Federation will be in production from this week. The plant is located at a small uranium deposit on the Nkana Mine owned by the Rhokana Corporation.

### Celanese Plant's Accident Free Period

The Belvidere, New Jersey, plant of Celanese Corporation of America has won the Harold Blancke Safety Award for 1956. The award is given each year in the name of the company president to the Celanese plant that has the best safety record for the preceding year.

The Belvidere plant, which manufactures acetate moulding material and trans-



Production area at Asahi-Dow's new polystyrene plant at Kawasaki, Japan, which went on stream on 20 February



parent sheet and film, completed 1956 with a record of no lost-time accidents dating back to 13 April 1954. During this period of 993 days the plant operated a total of 1,431,593 man hours. During this period the number employed was increased 50 per cent and there was an extensive building programme.

### Rhodesian Chemical Industry to Set Pattern for Future

Development of the chemical industry in the Federation would set the pattern of industrial development in the immediate future, said Mr. C. J. Hatty, Southern Rhodesia Minister of the Treasury, at the annual dinner of the Transvaal Chemical Manufacturers' Association in Johannesburg.

It was generally accepted, he said, that the usage of sulphuric acid was a barometer of industrial activity and development. The Federation's imports of this acid in 1955 were seven times those of 1954.

Recently a well-known group had embarked on building the first separate sulphuric acid plant in Southern Rhodesia, a plant large enough to satisfy the Federation's demands. This was a great step forward as rail freight charges formed a large part in the price paid by industry for sulphuric acid.

The country had ample supplies of iron pyrites, the chief raw material of the acid, and the establishment of this new plant probably marked the real beginning of the local chemical industry, declared the Minister. Production of the acid would enable fertilisers to be produced in the form of superphosphates for which a plant was now under construction. The manufacture of nitrogenous fertilisers should arise out of the expansion of steel production, or from direct utilisation of coal gas.

Local production of these fertilisers would cut down imports and help the balance of trade and balance of payments. Mr. Hatty said the time could come when some of the work of processing minerals could be done in the Federation. This would depend on plentiful power at low rates (Kariba) and a chemical industry.

### Bayer Acquire Capital of Argentine Borax Firm

Entire share capital of Coloidal SA, Buenos Aires, has been acquired by Farbenfabriken Bayer AG. In addition to borax and boric acid, Coloidal make chrome tanning salts. Bayer-Tanigane intend to set up a plant for the production of synthetic tanning agents. A plant for the production of plant protection media is to be built for the Bayer plant protection sales company in Argentina, Procampo SRL.

### Increase of Capital for Pechiney

Capital of Pechiney is being increased by Fr. 8,662.5 million to Fr. 25,986.5 million. A new issue of 1,732,500 shares of Fr. 5,000 each will rank as profit sharing from 1 January. The direc-

tors state that aluminium production in the French plants rose from 37,000 tons in 1938 to 127,000 tons in 1956. Chlorine output increased from 12,000 tons in 1938 to 55,000 tons in 1956. New projects include the manufacture of monovinylchloride, which reached an output of 18,000 tons last year. Plants for the production of beryllium, titanium and zirconium have been set up.

### New Pelletised Fertiliser

A new grade of Ammo-Phos pelletised fertiliser, 8-32-16, is being introduced this spring, by the plant food division of Olin Mathieson Chemical Corporation. Ammo-Phos 8-32-16 (the numbers refer to the nitrogen, phosphorus and potash content in that order) providing 56 units of plant food per hundred pounds of fertiliser, is said to be one of the most concentrated complete fertilisers on the market.

### New Acid Ester as Insect Attractant

As supplies of angelica-seed oil, used as an insect attractant for the Mediterranean fruit fly, were dwindling, the US Depart-

ment of Agriculture found that a series of new acid esters also acted as attractants. The most successful was the isopropyl ester of 6-methyl-3-cyclohexene-1-carboxylic acid.

This acid ester is not as effective as angelica-seed but it has the advantages of lower price, and, being a single compound, it is more uniform and stable than natural attractants.

Carbide and Carbon Chemicals company have been producing the synthetic in quantity.

### Lithium Production in Southern Rhodesia

Production of lithium in 1956 in Southern Rhodesia, estimated on the figures for the first 11 months, reached nearly 97,000 tons, worth nearly £400,000. This includes all three forms of the ore—amblygonite concentrates, petalite and lepidolite.

Lithium, neglected until recently, is now fast becoming one of the most important minerals in the world. It is used for fuelling rockets and guided missiles. It is also used to make hydrogen when mixed with water, to purify air in submarines, to de-ice aeroplane wings, and to prevent lubricants from melting in hot climates or freezing in cold climates.

## FOR YOUR DIARY

### MONDAY 25 MARCH

**Physical Society**—London: Royal Horticultural Society's Old and New Halls, Westminster. 11 a.m. Exhibition of scientific instruments and apparatus. Until 28 March.

### TUESDAY 26 MARCH

**SCI (Plastics and Polymer Group)**—London: 14 Belgrave Square SW1, 6.30 p.m. 'Polymers from Oxacyclobutanes': Synthesis and General Properties of Polymers from Substituted Oxacyclobutanes' by A. C. Farthing, 'Evaluation of Polymer from 3:3-Bis(chloromethyl) Oxacyclobutane. A New Thermoplastic' by D. J. Sandiford.

**CS**—Belfast: Queen's University, 7.15 p.m. 'General Uses of Ion-Exchange Resins' by Dr. T. R. E. Kressman.

**Rubber and Plastics Age**—London: Church House, Westminster SW1. International synthetic rubber symposium. Also on 27 and 28 March.

### WEDNESDAY 27 MARCH

**CS**—Dublin: University Chemical Laboratory, 7.45 p.m. Joint meeting with Institute of Chemistry in Ireland, RIC and SCI. 'Chemical Revolution in Textile Technology' by Professor J. B. Speakman.

**CS**—Portsmouth: College of Technology, Anglesea Road, 7 p.m. 'Chromatography' by Dr. Tudor S. G. Jones.

**SCI (Food Group)**—London: 14 Belgrave Square SW1, 9.30 a.m. to 5.30 p.m. One-day symposium on 'Physico-chemical Properties of Proteins with Special Reference to Wheat Proteins.' Speakers include M. A. Cookson, P. Halton, J. K. Pace, J. B. Speakman, S. V. Perry, A. G. Ward and G. Stainsby.

**OCCA**—London: Royal Society of

Tropical Medicine and Hygiene, 26 Portland Place W1, 7 p.m. 'Protection of Metals with Tannins' by E. Knowles and T. White.

**Fertiliser Society**—London: Geological Society, Burlington House, Piccadilly W1, 2.30 p.m. 'Use of Fertilisers in Solution' by Dr. N. H. Pizer.

**Institute of Fuel**—London: Institution of Civil Engineers, Great George Street SW1, 5.30 p.m. Four papers on 'Dust Deposition and Atmospheric Pollution' by C. J. Crawshaw and G. England, D. H. Lucas, W. G. Cummings and W. D. Jarvis and L. G. Austin.

### THURSDAY 28 MARCH

**Royal Society**—London: Burlington House, Piccadilly W1, 4.30 p.m. 'Infrared Spectrum and Molecular Configuration of Sodium Deoxyribonucleate' by G. B. B. M. Sutherland and M. Tsuboi; 'Wave Induction of a Vertical Water Film by an Accelerating Air Stream' by J. F. Davidson and J. E. Howkins.

**SAC**—Nottingham: Gas Showrooms, 7 p.m. Discussion on 'Analysis of Complex Sulphur Compounds' opened by C. E. Kendall.

### FRIDAY 29 MARCH

**CS**—Cork: University College, 7.45 p.m. Joint meeting with Institute of Chemistry of Ireland, RIC and SCI. 'Chemical Revolution in Textile Technology' by Professor J. B. Speakman.

**Institute of Metal Finishing**—Sheffield: Grand Hotel, 7 p.m. 'Silver Plating—Art or Science' by Dr. T. P. Hoar.

**ASLIB**—London: Royal Society of Arts, 8 John Adam Street, Adelphi WC2, 6 p.m. 'Re-organisation of a Special Library' by H. C. Richardson.



## METHODS OF HEAT CONSERVATION IN CHEMICAL ENGINEERING

**M**ETHODS OF CONSERVING heat in chemical engineering were outlined in a paper presented by Mr. E. Woollatt at a recent meeting of the North-Western branch, Institution of Chemical Engineers.

In addition to a mention of methods for a mere reduction of heat losses, Mr. Woollatt gave an account of other means by which fuel could be saved on a chemical plant or process. Capital costs of equipment that saved fuel should be considered. Thermal demands of a process could be reduced by adherence to the schedules of heating times, to the number of times the plant should be heated and to the duration of heating. Consideration should be given to mechanical means instead of evaporation for the removal of water and of solvents. Heat should be recovered from materials flowing out of the plant, particularly from waste materials.

Latent heat of steam from the exhausts of power plant should be used or re-used and the multiple effect principle of evaporation should be used with due regard to capital costs; in multiple effect plants in general the evaporation of water per pound of steam increased with increases in the temperature of the liquor; forward

feed was most economical with hot feed liquors but backward feed was best with cold ones. Vapour from the latter effect could be used to pre-heat the feed; in fact, the use of vapour need not be confined to the evaporator, it could be used for any purpose. Vapour re-compression whereby the vapour from an effect was compressed and returned to the steam space might be used where economies would result.

To reduce heat losses by lagging it was more important, Mr. Woollatt said, to cover all hot surfaces than to apply large thicknesses to them. Application of a layer of insulation to a wall of a furnace would alter the temperature distribution throughout the wall; indeed, it was sometimes necessary to lose heat to avoid excessive temperatures within the structure of the furnace. Mr. Woollatt then gave some of the characteristics of intermittently operated furnaces. Lagging of outdoor storage tanks was a complex problem, as heat was lost at different rates by the vertical and horizontal surfaces of rectangular tanks. As more heat was lost by the evaporation of hot liquids in tanks than from the bottom and sides of the tanks, the tanks should be covered.

### Venesta Open New Laboratory Wing

WITH THE opening of their new foil laboratory wing at Silvertown, London E16, this month, Venesta Ltd. claim to have established one of the largest and best equipped laboratories in the industry, offering the most comprehensive research and testing service to all users of foil.

The new block is linked with the old building. In the original block there are seven laboratories, a dark room, tropical room, balance room and offices.

In the new building, which is built on the first floor over existing storage premises, there are five new laboratories. These are the colour trials laboratory, general laboratory, coatings laboratory, balance and instrument room, and chemists' office.

Designed by the Venesta laboratory staff, under Dr. T. H. Angel, the new laboratories are so constructed that the internal partitioning walls can be removed if necessary, so that the size and shape of the laboratories can be changed.

The area of the new laboratories is 1,635 sq. ft. making the total working area of the laboratories 4,335 sq. ft. Building of the new laboratories was started in June 1956.

### USAC's 1956 Production

Output of the United Sulphuric Acid Corporation, Widnes, last year amounted to 148,000 tons, declared Mr. E. A. Goodland, general manager, at a dinner last week. On the same occasion, Mr. A. Davenhill, director of British Enka Ltd., said that home production of sulphuric acid was saving the UK millions of dollars.

### Export Surveys

#### Market for Dyestuffs in Greece

The market for dyestuffs in Greece, though small, is a steady one, according to a report on the market for dyestuffs in Greece prepared by the British Embassy in Athens and issued by the Export Services Branch, Board of Trade, Lacon House, Theobalds Road, London.

Pointing out that competition from W. Germany and Switzerland is severe, the report states there is no reason why UK manufacturers should not enlarge their share of the market, provided they are prepared to meet Greece's present main suppliers on their own terms.

#### Pesticides in El Salvador

A report on the market for pesticides in El Salvador has been issued by the Export Services Branch, Board of Trade, Lacon House, Theobalds Road, London WC1.

Growers are continually seeking more efficient chemicals, says the report, which adds that in order to enter this market UK exporters must offer attractive prices (quoted in US dollars c.i.f. Salvadorean port), not less than 180 days' credit terms and good deliveries, bearing in mind that the local farmer always orders at the very last moment and then requires his pesticides in a hurry.

### Industrial Textiles Fair

The second Industrial Textiles Trade Fair, to be held at the Royal Albert Hall, London, from 1 to 5 April, will feature: filter cloths for liquids and gases, protective clothing for chemical and other industries, tarpaulins etc.

### KID off Chemicals and Scientific Glassware

THE TREASURY has made an Order exempting certain types of scientific glassware and chemicals from key industry duty for the period from 20 March to 18 August 1957.

The scientific glassware comprises amber-coloured tubing of neutral glass, of specified dimensions, not being (1) glass with a content of more than 85 per cent of silica and boric oxide together nor (2) glass of fused silica or fused quartz. The chemicals are: Acetone cyanohydrin containing not more than 0.1 per cent by weight of free hydrogen cyanide 2-Diisopropylaminoethanol, DL-malic acid, and potassium stannate.

Copies of the Order, Safeguarding of Industries (Exemption) (No. 3) Order. SI 417/1957, may be obtained (price 2d net, by post 4d) from HM Stationery Office, London WC2.

### British Heat Exchangers for New Antwerp Plant

PLANT AT Antwerp of the Society Chimique des Services du Pétrole SA, incorporates 17 heat exchangers fabricated from 54 double pipe hairpin sections made by Brown Fintube (Great Britain) Ltd. Most of these units carry extended surface in the form of longitudinally finned fintubes.

Twenty-four of the exchangers were incorporated in the reaction and cracking sections and in the acetone recovery sections of the phenol acetone plant. A further 30 exchangers were included in the cumene and tetramer units. The combined feed exchanger incorporated on the trimmer section of the tetramer unit consists of ten 15 ft. hairpin sections, each having a shell size of 3 in. schedule 40, and a tube size of 1½ in. schedule 40 and carrying a total surface area of 750 sq. ft. This area was obtained by the incorporation of 24 ½ in. high fins on to the inner tube.

This unit is capable of exchanging 3,120,000 BTU'S an hour and is arranged in two parallel banks, each consisting of five hairpin exchangers. It is designed for use at an operating pressure on both the shell and tube side of 795 p.s.i.g. at 650°F and is manufactured from carbon steel throughout.

### Progress at Bihar Explosives Factory

Last week, Dr. J. M. Holm and Mr. F. B. Wrightson of the Nobel division board, Imperial Chemical Industries Ltd. returned to Glasgow after a brief visit to the Gomia site of Indian Explosives Ltd., Bihar. It is expected that several sections of the non-danger area will start operating trials early in 1958; plants expected to be ready then are those for acid and ammonium nitrate.

### Oxygen Store for Norfolk

A new store has been set up on the east coast by British Oxygen Gases Ltd. because of the difficulty of maintaining an efficient supply due to petrol restrictions. The store is at the premises of P. C. H. Johnson (Leverington Transport Ltd.) at Terrington St. Clement, Norfolk. It will serve the areas of King's Lynn and Hunstanton.

● **MR. HARRY WARNE**, works manager, has been appointed to succeed **MR. W. COLLISON** as managing director of **William Blythe and Co. Ltd.**, Church, nr. Accrington, from 1 April. He has been in the service of the company for 10 years and was appointed a director in 1955. Changes have also been made in top positions in the associated company, **John Riley and Sons Ltd.**, chemical manufacturers, Hapton. **MR. K. ASPIN** and **MR. F. WHITHAM** have been appointed joint managing directors.

● **MR. R. YUDOLPH**, sales manager of the building chemicals division of **Evode Ltd.**, Stafford, has been appointed a sales director. This year the company celebrates its 25th anniversary.

● **MR. J. I. BERNARD** has been appointed director and secretary of the **British Electrical Development Association** as from 1 April. **Mr. Bernard**, who succeeds **Mr. V. W. Dale**, has been **BEDA** chief technical officer since 1936.

● **MR. JOHN LUCKMAN**, manager of **Dunlop's** overseas operations division, has been appointed managing director of **Dunlop (India)**.

● In connection with plans for an extensive programme of fundamental research in various branches of chemistry,



**Dr. Boscott**

**Pfizer Ltd.**, Folkestone, have appointed **Dr. R. J. BOSCOTT**, B.Sc. (Hons.), Ph.C., A.R.I.C., as head of chemical research. The new post is a major appointment. **Dr. Boscott**, who is 41 years old, will take up his duties in the near future. Since 1948 he has been lecturer in endocrine chemistry at the **Medical School, Birmingham University**. Previous appointments were: research organic chemist in the endocrine unit of **London Hospital**; chief chemist of the **Standard Laboratories** (where he was specifically engaged in cancer research); and senior assistant organic chemist in the **BDH hormone department**.

**Dr. Boscott** is a member of the **Institute of Chemistry**, the **Chemical Society**, the **Society for Chemical Industry**, the **Endocrine Society** and the **Biochemical Society**. Among the subjects of **Dr. Boscott's** numerous publications are: analytical chemistry, chemistry, endocrine chemistry, chemical pathology, nutrition, biochemistry in relation to experimental psychiatry, chemistry in the control of human fertility, and world population problems.

● **SIR ALFRED EGERTON**, Emeritus Professor of Chemical Technology in the **University of London**, is in the **Middle East** for the **British Council**, lecturing and advising on the organisation of scientific research. During his tour, which

## People in the NEWS

started on 20 March and will last until 11 April, he will visit **Lebanon**, **Iraq** and **Iran**. In each country he will lecture to specialist audiences on 'Combustion and Flame' and to more general audiences on 'The World Resources of Energy.' **Sir Alfred Egerton** was professor of chemical technology at the **Imperial College of Science** from 1936 to 1952. He was secretary of the **Royal Society** from 1938 to 1948 and chairman of the **Scientific Advisory Council** to the **Minister of Fuel and Power** from 1948 to 1953. He is a member of the executive committee of the **British Council** and chairman of its **Science Advisory Committee**.

● **MR. J. M. STOREY**, managing director of **Dewrance and Co. Ltd.**, valve manufacturers, is to head a British economic, technical and goodwill mission that is to visit the **Canadian petroleum and allied industries** in May. Sponsored by the **Council of British Manufacturers of Petroleum Equipment**, the mission will visit all important oil installations and companies in **Canada**. Deputy leader is **MR. G. L. HANCOCK**, **David Brown Industries Ltd.** Other members will be nominated by **BTH Export Co. Ltd.**, **Coventry Gauge and Tool Co. Ltd.**, **Metropolitan-Vickers Electrical Export Co. Ltd.**, **F. Perkins Ltd.**, **Petbow Ltd.**, **Steel Equipment Co. Ltd.**, **Winn and Coales Ltd.**, and **Yorkshire Copper Works Ltd.**

● **MR. E. A. COOKE**, M.I.Mech.E., who has been appointed scientific engineer to the **Sheepbridge group of companies**, was formerly chief development engineer at **W. T. Avery Ltd.**

● **MR. E. W. DANCE**, a laboratory assistant in the resins section of the **ICI dye-stuffs division research department** has been granted leave of absence to join the **Manchester Himalayan Expedition**, which is expected to leave the **UK** at the end of April. The expedition, which has the backing of the **Everest Foundation** and the **Manchester Guardian**, will tackle the **Masherbrum (25,660 ft.)** and **Saltoro Kangri (25,400 ft.)**. **Mr. Dance's** task will be to organise food for the party of six.

● **SIR EWART SMITH**, a deputy chairman of **ICI Ltd.**, presented long service awards to 200 employees of the **Alkali division**

at a dinner given at **Northwich**. Among the recipients was **Mr. J. K. Batty**, chairman of the **alkali division**, who received a gold pocket watch for 30 years' service. **Sir Ewart** said that the **ICI** owed much to the division and its founders—**Ludwig Mond** and **John Brunner**. **Lord Melchett**, as one of the founders of **ICI** had brought into it the liberal and advanced ideas fostered in the **Brunner Mond Co.** at **Northwich**. **Sir Ewart** also referred to the division's development of **polythene** and said that world production was now running at a rate of 1 million tons a year.

● **PROFESSOR G. WESLEY AUSTIN** has accepted an engagement as consulting supervisor to the metallurgy division of the **British Iron and Steel Research Association**. He will be responsible for the general supervision of the metallurgical research programme on behalf of the **BISRA metallurgy (general) panel**.

● **MR. W. R. OWEN**, manager of the **Sheffield branch office of Honeywell-Brown Ltd.**, has been appointed manager for the north east region. **MR. A. HAGUE**, **Mr. Owen's** deputy for the past three years, succeeds him as manager of the **Sheffield office**.



**W. R. Owen**

● **DR. FRANK HARTLEY**, scientific services director of the **British Drug Houses Ltd.**, and chairman of the **British Pharmaceutical Conference, 1957**, has been elected treasurer of the **Chemical Council** by the three chartered chemical bodies.

● **MR. K. G. SINCLAIR** has been appointed chairman of **Griffin and George Ltd.**, laboratory furnishers.

● **MR. GEORGE BREARLEY** will leave the partnership of **Cremer and Brearley**, chemical engineering consultants, on 31 March on his appointment as director and secretary of the **Association of British Chemical Manufacturers**. As from 1 April the remaining partners will continue the practice as **Cremer and Warner**. **Mr. F. E. Warner**, B.Sc., M.I.Chem.E., joined the partnership last October.

● **MR. JOHN C. SANFORD**, general manager of **Chemical Materials Pty. Ltd.**, **Federal Road, Glebe, Sydney**, is arriving in **London** on 1 April for a month's stay. Purpose of his visit is to arrange for the sale of his firm's specially blended chemicals and to arrange for additional **UK agencies**. **Chemical Materials** are primarily specialists in surface active agents.

**Mr. Sanford** seeks **UK agencies** for manufacturers of industrial chemicals connected with surface active agents. Firms wishing to contact **Mr. Sanford** should write first to the **Export Services Branch, Board of Trade, Lacon House, Theobalds Road, London WCI**, giving details of their products.

## Commercial News

# Gas Purification's Business Shows 'Great Vitality'

**I**NTERIM dividend of 1s per 5s share has been declared by Gas Purification and Chemical Co. Ltd. in respect of the extended period of 15 months to 30 June 1957. In future audited figures of profit earned in each half-year—June to December and December to June—will be published. The business shows 'great vitality', in spite of teething troubles on some new products. The board hopes to maintain the annual rate established last year, subject to unforeseen circumstances; this would result in a payment of 50 per cent for the 15 months.

### Bakelite Ltd.

Group profits of Bakelite Ltd. for 1956 were £474,921 (£645,725). There was exceptional expenditure on the Aycliffe factory—£53,042 (nil)—and for research—£17,367 (£21,000). Net profits amounted to £209,986 (£337,325). Final dividend of 10 per cent (11 per cent), making 15 per cent (16 per cent) is declared. More than half the ordinary capital is held by Union Carbide and Carbon of the US. Annual meeting will be held on 30 April.

### Minerals Separation

Preliminary figures of Minerals Separation Ltd. for 1956 show an increase from £434,493 to £705,000 in group profit. This reflects inclusion of the profits of Foundry Services (Holdings), a subsidiary since October. Dividend is 30 per cent (25 per cent) with an unchanged second interim of 20 per cent (same) in lieu of a final.

### Aspro-Nicholas Ltd.

Trading profit and other income before tax for the nine months to 31 December of Aspro-Nicholas Ltd. is estimated at £475,000. A third quarterly interim dividend of 6 per cent, making 18 per cent to date (against 21 per cent for the same period last year) is declared.

### Shell on Wall Street

Shares of the Shell Transport and Trading Co. Ltd. were admitted to trading on Wall Street on 13 March. Each New York share represents one unit of ordinary stock of £1 nom. and these shares have been issued as depository stock by the Irving Trust Co. Opening transaction of 3,000 shares was \$22½; the issue closed at \$24½.

### Townson & Mercer

Townson and Mercer Ltd., scientific equipment manufacturers, Beddington Lane, Croydon, Surrey, have taken over the assets of the Scottish Instrument Co. Ltd., 4-7 Teviot Place, Edinburgh 1.

As from 1 April, the Scottish company will operate as Townson and Mercer Ltd. (Scottish Division). They will also control the extreme North of England. Mr. P. J. W. Buckman, who has previously acted as technical representative in the North of England, will be the manager.

### Record BIP Turnover

Net profit, before tax of British Industrial Plastics Ltd. for the year ended 30 September was £616,349 (£559,464). This profit rate was achieved, said Mr. E. R. Crammond, chairman, at the annual meeting last week, despite the fact that existing price levels of the products of the chemical factories had been maintained as far as practicable. Group turnover was again a record, and was about 6½ per cent up on 1955.

### Newton Chambers and Co.

Net profit for 1956, after tax, of Newton Chambers and Co. Ltd. was £361,486 (£371,927). Taxation took £420,863 (£409,667). Final dividend of 9 per cent is declared, making 15 per cent (same).

### Negretti and Zambra

Net profit for Negretti and Zambra Ltd., makers of scientific instruments, for the year ended 30 September was £260,258 (£217,552). Tax amounts to £131,405 (£106,720). Final dividend of

11 per cent, making 15 per cent is proposed on ordinary. £451,052 (£357,417) is carried forward. Turnover during 1956 was valued at more than £1,300,000, a rise of over £100,000 compared with 1955 about £900,000 up on 1947. It is proposed to increase the capital by £475,000.

### Wailes Dove Bitumastic

Wailes Dove Bitumastic announce that CIC consent has been received for a one-for-10 rights issue at 15s 6d a share.

### Borneo Oil Transfer

Brunei Shell Petroleum Co. Ltd., the new Shell group company registered in Brunei at the beginning of this year, is now working on its own account and the British Malayan Petroleum Co. Ltd., registered in the UK, will go into liquidation. In effect operations will continue unchanged, actual transfer of the day to day business took place on 15 March.

### INCREASE OF CAPITAL

H. E. DANIEL LTD., dealers in chemicals etc., St. Bernard Works, Stoney Lane, London SE26. Increased by £9,000 beyond the registered capital of 1,000.

### PUBLIC EXAMINATION

MRS. V. A. C. PITTS, Well Lane, Chester, who began a chemical business with 30s. capital, appeared for her public examination at Chester Bankruptcy Court, on 14 March. She said she bought and sold chemicals on knowledge she had picked up, having helped her father previously. She started her business, V. Pitts and Co., at Lymm, before moving to Chester. In 1953, she started with her father, the Piro Manufacturing Co. She admitted unsecured debts of £10,975, with estimated assets of £603. An arrangement was proposed by which it was hoped to pay creditors 5s. in the £. The examination was adjourned.

## Market Reports

# STEADY HOME AND EXPORT TRADING

**LONDON** Both home and export demand for chemicals have been reasonably steady, but at the time of this report industry generally is faced with the possibility of an engineering strike, which could dislocate production and have serious repercussions on British trade. Industrial chemical prices are on a firm basis with no changes reported on the week. There has been a brisk demand for borax and boric acid; hydrogen peroxide is in good request, while the call for fertilisers is well sustained. Steady price conditions prevail on the coal-tar products market, with demand continuing on a good scale.

**MANCHESTER** Trading conditions in most sections of the Manchester market for heavy chemicals during the past week have been on steady lines, with the wide range of textile bleaching, dyeing and finishing products being called for

in reasonably good quantities against contracts. Other leading industrial consumers are mostly giving a satisfactory account of themselves in this respect. A fair number of new home and export inquiries have been circulating. Prices generally continue on a firm basis. Most fertilisers are now meeting with a steady demand, and a ready outlet is being found for the leading tar products.

**GLASGOW** Various sources report that business has again been brisk. There has been a demand for a range of chemicals connected with a varied cross section of the industry. Some forward bookings have been placed, and once again contract requirements are being well taken up. Fertilisers continue to show interest, in particular to forward deliveries, while the export market has also shown an improvement.



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We also welcome your enquiries for the following imported products which are manufactured by associated companies in the U.S.A.

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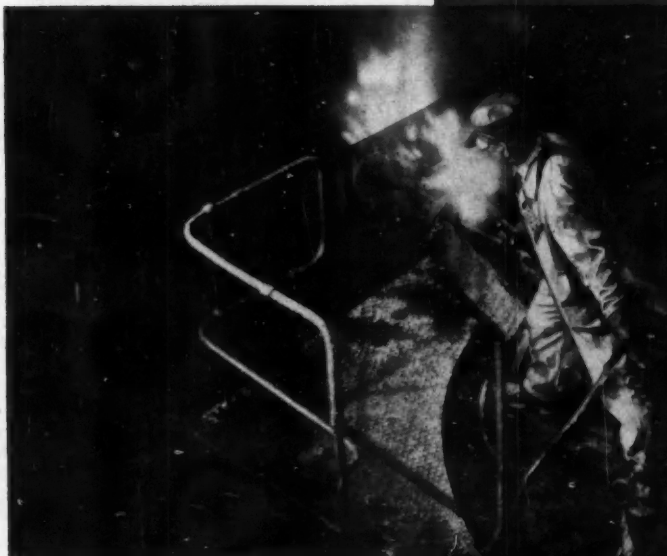
**Dihydroxy diphenyl sulphone**—Electroplating bath additive, phenolic resin base, organic intermediate.

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# NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London, WC2, price 2s 6d including postage; annual subscription £6 6s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period. Dates on which these applications will be open to inspection are given in 'Official Journal (Patents)'.

## AMENDED SPECIFICATIONS

Utilisation of the nuclear combustion of hydrogen. Hemens, G. F. 755 903

## ACCEPTANCES

Plant protective. Fahlberg-List Ges. 773 123  
 Pyridoxamine. Lepetit Soc. Per Azioni. 773 354  
 Combined anaerobic treatment and clarification unit. Dorr-Oliver Inc. 773 124  
 Extruded foams. Monsanto Chemical Co. 773 125  
 Vulcanisation accelerators. United States Rubber Co. 773 178  
 Apparatus for collecting liquid samples. LKB-Produkter Fabriksaktiebolag. 773 357  
 Esters of chloromethyl benzoic acids. Perfogit Soc. Per Azioni. 773 131  
 Calcium complex of tetracycline. Bristol Laboratories Ltd. 773 486  
 Free-flowing solid salts of alkenyl aromatic resin sulphonic acids. Dow Chemical Co. 773 488  
 Salts of streptomycin and its derivatives. Farbwerke Hoechst AG. 773 139  
 Piperidine derivatives. Sandoz Ltd. 773 183  
 Antioxidants and stabilisers for mineral oils. Chemische Werke Hüls AG. 773 489  
 Stabilising halogenated methanes. Farbwerke Hoechst AG. 773 187  
 Filters for volatile liquids. Fram Corp. 773 490  
 Crystallisable complex of vitamin A aldehyde and sesamol. Eastman Kodak Co. [Addition to 765 533.] 773 189  
 Process for moulding so-called plastic materials. Smith, J. F. P. 773 971  
 Nickel alloys. Jessop, W., and Sons Ltd. 773 871  
 Copolymers containing carboxyl groups. Farbwerke Hoechst AG. 773 573  
 Lubricants for use in making shell moulds and cores. Polygram Casting Co. Ltd. 773 684  
 Acetyl chloride. Wacker Ges. für Elektrochemische Industrie Ges., Dr. A. 773 775  
 Furnace carbon black and burner therefor. Cabot, G. L., Inc. 773 777  
 Glycidyl ethers containing nitrogen. Cassella Farbwerke Mainkur AG. 773 874  
 Filtration of fluids. General Motors Ltd. 773 875

Filament and film-forming polyethylene terephthalates. Du Pont de Nemours, E. I., and Co. 773 778  
 Substituted morpholines. Boehringer Sohn, C. H. 773 780  
 Production of artificial filaments. Files de Calais SA. 773 781  
 Silicone water-repellents. General Electric Co. 773 974  
 Metal-containing polyazo dyestuffs of the stilbene series. Sandoz Ltd. 773 790  
 Filters for liquids or gases. Muller, J. 773 588  
 Method and apparatus for sieving solid and liquid material. Rheum Rheinsche Werkzeug-und Metallwarenfabrik Ges. 773 589  
 Bleached sugar cane wax esters and amides for use in polishes and the production of said esters and amides. Commonwealth Scientific and Industrial Research Organisation. 773 590  
 Apparatus for the treatment of textiles. Imperial Chemical Industries Ltd. 773 968  
 Purification of molten glass. Gell, P. A. M. 773 886  
 Aromatic ether or thioether carboxylic acids and their salts or esters. Henkel and Cie. Ges. 773 594  
 Plasticised vinyl chloride resins. Imperial Chemical Industries Ltd. 773 986  
 Production and/or stabilisation of hydroquinones. Gillette Industries Ltd. 773 794  
 Polymeric materials from bifunctional polyisocyanates and polyesters, polyesteramides and polyethers. Imperial Chemical Industries Ltd. 773 991  
 Fungicidal compositions. Imperial Chemical Industries Ltd. 773 798  
 Treatment of soap. Unilever Ltd. 773 995  
 Halophosphate phosphors. British Thomson-Houston Co. Ltd. 773 960 and 773 961  
 Mineral-base lubricating oils. Esso Research and Engineering Co. 773 999  
 Synthetic resinous condensation products and adhesives. Monsanto Chemical Co. 773 897  
 2-Cyanoethylated N-substituted imines. Farbenfabriken Bayer AG. 773 807  
 Cellulose xanthate. Courtaulds Ltd. 774 004  
 Dispensing devices for liquid or semi-liquid materials. Horton Manufacturing Co. Ltd. 773 900  
 Resol resins. Distillers Co. Ltd. 773 611  
 Roasting of sulphide materials. Aktiebolaget Cellego. 773 808  
 Shaped elements from urea-formaldehyde foam. Cogepa Etablissement Commercial. 773 809  
 Water treatment chemicals proportioning apparatus. Imperial Chemical Industries Ltd. 773 613  
 Seed disinfectants. Farbenfabriken Bayer AG. 773 810  
 Fluorescent stilbyl triazole compounds. Geigy, J. R., AG. 774 010  
 Derivatives of dibenzothiophene dioxide. Ciba Ltd. 773 617  
 Liquid-fuel evaporators. Bok, H. F., and Bok, E. 774 013  
 Linear high polymers with urea as constituent. Toyo Katsui Industries Inc. 773 964  
 Thermally stable bituminous bonding materials. Carlisle Chemical Works Inc. [Addition to 755 848.] 774 017  
 Method of making 2-tertiarybutyl-4-alkoxy-phenols. Eastman Kodak Co. 774 018

Cationic surface-active bitumen additives. Swan, T., and Co. Ltd. 773 622  
 Activation and reactivation of silver catalysts for the oxidation of ethylenic hydrocarbons. National Research Council. 773 815  
 Apparatus for dispersing gas in a liquid contained in a vessel. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. 773 907  
 Arrangements for separating or separately detecting charged particles of different specific charges. Paul, W. 773 689  
 Molybdenum lubricants. Institut Français du Pétrole des Carburants et Lubrifiants. 773 829  
 Electrostatic precipitators. Research Corporation. 773 694  
 4-Hydroxycoumarin derivatives. Spofa, Spojené Farmaceutické Závody Národní Podnik. 773 824  
 Fat-liquoring compositions. Nopco Chemical Co. 773 825  
 Base material for powders and liniments to be used on human skin. Aktiebolaget Bofors. 774 029  
 Dimethyl sulphide. Nitroglycerin Aktiebolaget. 773 697  
 Coating strand of glass fibres with resinous material. Owens-Corning Fiberglass Corp. 774 031  
 Producing coatings from hard high-melting point nitrides. Metallges AG. 773 702  
 Metal pipes for conveying liquid and the cathodic protection of such pipes. Hughes, F. A., and Co. Ltd. 774 033  
 Dyeing with dyestuffs containing metal in complex union. Badische Anilin- und Soda-Fabrik AG. 774 035  
 Silver-tarnish inhibitor. Orchard Paper Co. 773 833  
 Jet-fuel compositions. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. 774 037  
 Hexaethylcyclotrisiloxane. Union Carbide and Carbon Corp. 774 040  
 Fluid-tight containers. Jagenberg-Werke AG. 773 714  
 Polyazo dyestuffs. Cassella Farbwerke Mainkur AG. 773 913  
 Lubricants. Westinghouse Electric International Co. 773 916  
 Clarifying water. Union Chimique Belge SA. 773 716  
 Treating films made from solid polymers of ethylene. Du Pont de Nemours, E. I., and Co. 773 718  
 Removing solid deposits such as slag from hot spaces such as slag pockets of furnaces or like. Kruk, G. 773 836  
 Preparation of ferrous surfaces to receive vitreous enamel. Pyrene Co. Ltd. 773 723  
 Method and device for production of energy from exothermal chemical or nuclear reactions. Schmidt, P. 774 052  
 Electrostatic precipitators. Westinghouse Electric International Co. 774 055  
 Liquid filter. Argo Ges. für Feinmechanik. 774 058  
 Salt blocks. Midland Silicones Ltd. 773 728  
 Derivatives of N-diacetylalkylthiocholchicenes. Uclaf. 773 729  
 Manufacturing paper. Warren, S. D., Co. 773 732  
 Settled suspension polymerisation process. Dow Chemical Co. 773 737  
 Derivatives of polyethylenes of high molecular weight. Farbenfabriken Bayer AG. 773 922  
 Pharmaceutically active hexamethylene tetramine complexes. Badische Anilin- und Soda-Fabrik AG. 773 743  
 Quaternary salts of amino carbinols. Wellcome Foundation Ltd. 773 748  
 Reduction of epoxy ketones to 16  $\alpha$ -20  $\alpha$ -dihydroxy-steroids. Farmaceutici Italia SA. 773 751



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This standard is technically identical with IP 139/57T which is in turn identical with specification D974-55T of the American Society for Testing Materials.

Copies are obtainable from the BSI Sales Branch, 2 Park Street, London W1. Price 3s.

### Germany Orders Atomic Power Station from UK

GERMANY has placed an order for a small atomic power station with Mitchell Engineering Ltd., London, and their American associates A.M.F. Atomics Inc., New York.

The station is to be built in the Ruhr for Rheinisch-Westfälisches Elektrizitätswerk AG.

Value of the order for the nuclear work is \$5,300,000 (nearly £1,893,000) of which about three-fifths will be earned in dollars by Mitchell Engineering for construction of the reactor shell, heat exchangers and other equipment associated with the purely nuclear side of the station. The US firm will provide the reactor core and the control devices.

### BoT CLOSSES SOME REGIONAL OFFICES

THE BOARD OF TRADE is to make the following changes in their regional organisation to operate from about June 1957: closing of the North Midland Regional Office at Nottingham and transfer of work to the Birmingham Office (Midland Region) except that for Lincolnshire, which will be transferred to the Leeds Office; closing of the Eastern Regional Office at Cambridge and transfer of work to London; closing of the Southern Regional Office at Reading and transfer of work to London except that for Dorset (not Poole), which will be transferred to the Bristol Office (SW Region); closing of all district offices except Inverness and transfer of work to the appropriate regional offices.

A new regional office will be set up in London to deal with the work of the present Eastern Region plus that for Oxfordshire, Buckinghamshire and Berkshire which is at present being carried out at Reading. This new office will be located as a separate unit in the same building as the present London and South Eastern Regional Office. The latter office will take over Hampshire and Poole.

### ICI Give £10,000 to College

Imperial Chemical Industries Ltd., have given £10,000 towards the North Staffordshire University College Appeal Fund. They stipulate that the money shall be used in the college's department of chemistry.

### Birwelco will Supply Equipment for Esso's Butadiene Plant

A CONTRACT for the supply of equipment to be used in Esso's butadiene plant at Fawley, Hants, has been awarded to Birwelco Ltd., Aston, Birmingham, British manufacturing licencees for Petro-Chem Iso-Flow fluid heating furnaces. The largest unit will be a specially designed Petro-Chem Iso-Flow furnace with a heat release of 192 million BThU an hour. Standing 180 ft. high, the heater will be the first Iso-Flow furnace in use in the British Isles.

Included in the contract are three smaller heaters and a quantity of heat exchange equipment to be supplied by Birwelco's associated company, Brown Fintube (Great Britain) Ltd. The contract is valued at approximately £250,000.

Foster Wheeler Ltd. are responsible for the engineering and construction of the butadiene plant.

### Obituary

MR. WILLIAM ADAMS, founder of Adams (Durham) Ltd., manufacturing chemists, has died at his home at Shotley Bridge at the age of 56.

### Will

MR. FREDERICK MORRIS ROBERTS, former vice chairman and joint managing director of A. Boake, Roberts and Co., one of the original directors of Sugar and Malt Products Ltd., who died on 12 January, left £189,425 net.

## Rockets and Guided Missiles

By

JOHN HUMPHRIES

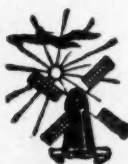
INTENDED in the main for engineers and technicians, this complete survey of present-day achievements and possible future developments presents the latest information on rocket motors and their applications from an engineer's point of view. Both solid and liquid propellant motors are discussed, the latter more fully as being of greater interest to the engineer. The first half of the book covers propellants, motors and components, the second, the applications of these motors to missiles and aircraft, and in conclusion a review of potentialities for the future is appended. The author has had wide practical experience following a brilliant scholastic career, and is at present actively engaged on rocket research.

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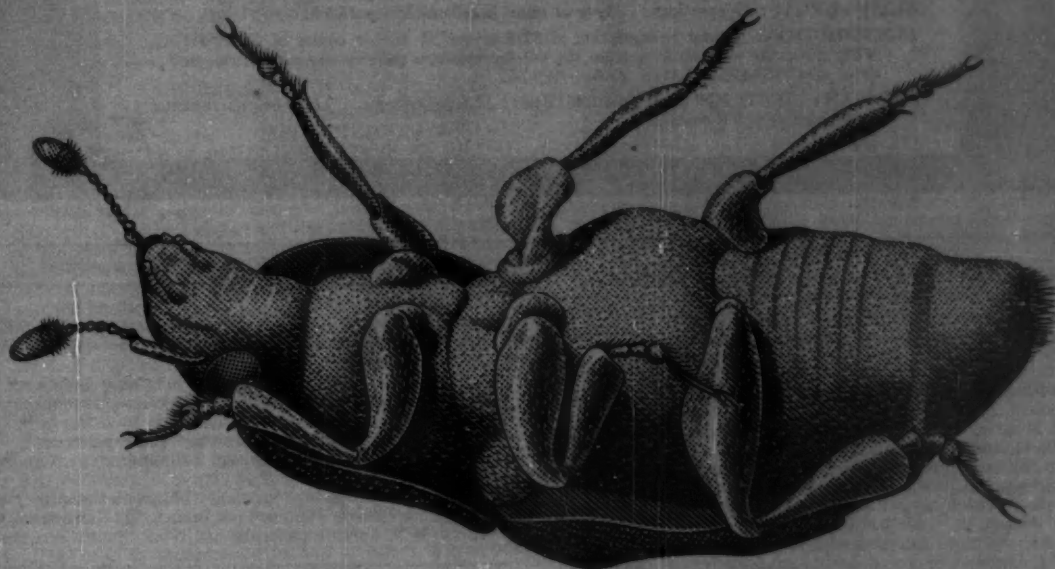
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## OFFICIAL APPOINTMENTS

### SENIOR SCIENTIFIC OFFICERS SCIENTIFIC OFFICERS

The Civil Service Commissioners invite applications for pensionable appointments covering a wide range of scientific research and development in most of the major fields of Fundamental and Applied Science. In Biological subjects the number of vacancies is small. Individual vacancies exist in the Natural History Museum for candidates who have special knowledge of, or who are interested in, Crystallography, Taxonomic Entomology, Mammalian Osteology, Palaeobotany, Malacology, Helminthology, Acarology.

Scientific Officers are urgently required for the Forensic Science Laboratories; for scientific examination of document and handwriting cases at Cardiff; for Chemists at Preston, Harrogate and in London.

There is also a vacancy for a Senior Scientific Officer (Biologist) at Harrogate.

Candidates must have obtained a University Degree with first- or second-class honours in an appropriate scientific subject (including Engineering) or in Mathematics, or an equivalent qualification, or be otherwise qualified by high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience.

**Age Limits.**—Senior Scientific Officers, between 26 and 31, but specially suitable candidates under 26 may be admitted; for Scientific Officers, between 21 and 28 during 1957 (up to 31 for permanent members of the Experimental Officer Class). Salary (London) Senior Scientific Officers: Minimum £1,135 (women £1,047). Men's scale maximum £1,345. Scientific Officers: Minimum £605. Men's scale maximum £1,055. Women's pay above £605 slightly lower but being raised to reach equality with men's in 1961. Somewhat lower rates in the provinces. 5-day week, generally.

Further particulars, from Civil Service Commission, Scientific Branch, 30 Old Burlington Street, London, W.1, quoting No. S.53/57, for Senior Scientific Officers, and S.52/57 for Scientific Officers.

Interview Boards will sit at intervals, as required. Early application is advised.

Z2837/120/1/57/JT/b

### NORTH THAMES GAS BOARD

A SENIOR DRAUGHTSMAN, aged 30-45, is required at the Chemical Products Works, Beckton, E.6.

Candidates should have considerable experience in the design and layout of plant from flow diagrams and in the preparation of schemes and contract specifications both for development and maintenance work.

Starting salary will be within the range £750 to £900 per annum according to age, qualifications and experience. The successful candidate will be required to join the Staff Pension Scheme.

Applications, giving age and full particulars, to Staff Controller, North Thames Gas Board, 30, Kensington Church Street, W.8, quoting reference 666/324.

## OFFICIAL APPOINTMENTS: continued

DRAUGHTSMEN are required by the NORTH THAMES GAS BOARD at its TAR AND AMMONIA PRODUCTS WORKS AT BECKTON, EAST HAM, E.6.

The posts offer possibilities of obtaining experience in the expanding field of Chemical Engineering for applicants who have had a sound mechanical training.

Starting salary will depend on age and experience.

The successful candidate will be required to join the Staff Pension Scheme.

Applications, giving age and full particulars, to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, W.8, quoting reference 666/389.

### NORTH WESTERN GAS BOARD SOUTH LANCASHIRE GROUP CHIEF CHEMIST—ST. HELEN'S WORKS

Applications are invited for the above pensionable appointment at a salary within Grade A.P.T.11 (£850-£975 p.a.).

Applicants must possess suitable technical qualifications and have had sound experience and training in the chemical control of a large gasworks.

Detailed applications, giving the names of two referees, should reach the General Manager, South Lancashire Group, N.W.G.B., Radiant House, Cotham Street, St. Helens, within 14 days.

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### THE INSTITUTION OF CHEMICAL ENGINEERS 33rd (1957) EXAMINATION

Application form for entrance to the 1957 Examination, returnable not later than the 1st June, 1957, may be obtained from the General Secretary, The Institution of Chemical Engineers, 16, Belgrave Square, London, S.W.1.

## SITUATIONS VACANT

**MECHANICAL ENGINEER**, for senior position required for design work on Petroleum, Chemical and Nuclear plants by London consulting organisation. B.Sc. and some industrial experience are minimum qualifications. Please send full particulars of qualifications, experience and salary envisaged, to **HEAD WRIGHTSON PROCESSES LTD., 24-26, BAL TIC STREET, E.C.1.**



## SITUATIONS VACANT: continued

**CHEMICAL ENGINEER.** Consulting organisation handling Petroleum, Nuclear and Chemical Plants require a Senior Chemical Engineer. He should be capable of assuming full responsibility for all process design on large contracts including flow-chart development, design and specification of equipment, and liaison with client. Applicants must have had similar experience preferably in the field of petroleum processing. Please send full details of qualifications, experience and salary envisaged, to **HEAD WRIGHTSON PROCESSES LTD., 24-26, BAL TIC STREET, E.C.1.**

## CHEMIST I AND II

Vacancies exist with the Research and Development Branch of the Industrial Group of the **UNITED KINGDOM ATOMIC ENERGY AUTHORITY** at its **HEADQUARTERS AT RISLEY, WARRINGTON, LANC.**

## DUTIES:—

Responsibility for investigation in one of the following fields:—

- Evaluation of experimental and theoretical data relating to all stages of processing irradiated fuel elements from both power-producing and advanced experimental reactors. This includes the separation of fertile and fissile materials, and the handling and disposal of fission products.
- Special Appreciations of new chemical processes including fuel preparation and post irradiation processing, fission product disposal and the separation of various isotopes by chemical means.
- Technical and economic evaluation of processes for the production of the more unusual metals in the pure state from their naturally occurring ones. The metals are those which have potential applications in reactor programmes, e.g. Beryllium, Zirconium, Niobium, etc. The work will involve technical feasibility studies, plant and operating cost studies and guidance on process development studies.

Close collaboration with the Authority's laboratories and design offices or other organisations will be necessary in each post.

## QUALIFICATIONS AND EXPERIENCE:—

Preferably, applicants should possess a degree or post graduate qualifications in Chemical Engineering, or be a member of the Institution of Chemical Engineers. Exceptionally, similar qualifications in Chemistry will be acceptable. All applicants must possess a number of years post graduate experience of process research or development.

For appointments (a) and (b) experience of working under radioactive conditions would be an advantage, for appointment (c) experience in extraction metallurgy related to the newer metals, would be helpful.

**SALARY** will be assessed within one of the following scales:—

Chemist I £1,705-£1,980 p.a.

Chemist II £1,235-£1,655 p.a.

A contributory Pension Scheme is in operation.

Authority houses for renting by successful married candidates may be available in due course, or alternatively, substantial assistance may be given towards legal expenses incurred in private purchase.

Send postcard asking for an application form and quoting reference 1,806 to The Recruitment Officer, United Kingdom Atomic Energy Authority, Industrial Group Headquarters, Risley, Warrington, Lancs.

Closing Date—8th April, 1957.

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**MIXERS**—1 Baker Hand-tilted Trough, 16 in. by 24 in. by 20 in. Fast and loose pulleys and clutch. "Z" blades.  
1 Ditto Power-tilted Trough, 30 in. by 20 in. by 24 in. Pulley drive and clutch. Four "L" blades.

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**CHILLING PLANT BY WILLIAM DOUGLAS & SONS LIMITED OF PUTNEY**, comprising Rotating Chilling Drum 5 ft. 1 in. face by approx. 2 ft. 9 in. diam., cored for cooling, gear driven by direct coupled 2 h.p. motor through Croft enclosed reduction gear. Drum supported on heavy cast-iron side frames and complete with take-off knife. Included is a Nicol Patent Mechanical Texturizer by William Douglas with motor drive, Circulating Pump mounted on cast-iron under-bed and Douglas Nicol Atomiser direct coupled to motor on cast-iron under-bed.

**AMMONIA COMPRESSOR BY DOUGLAS**, type P.6, 6 in. by 6 in., 400 r.p.m., 130,000 BThU's, vee-belt drive to flywheel by 17 h.p. S/R motor, with all accessories including gauges, Horizontal Tubular Condensers, Evaporator, Ammonia Tank, Connecting Piping, Water-cooled Pumping Set and Tubular Cooling Water Condenser.

**ROTARY BELT-DRIVEN CHILLING MACHINE** with roll approx. 5 ft. 1 in. long by 2 ft. 9 in. diam., cored for brine cooling. Take-off Knife fitted.

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The Proprietors of Patent No. 648844, for "Improvements in Heat-Reactive Resin-Impregnated Sheets for Adhesive Purposes", desire to secure commercial exploitation by licence or otherwise in the United Kingdom. Replies to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, W.C.2.

The Proprietors of Patent No. 631325, for "Manufacture of Hydrocarbons", desire to secure commercial exploitation by licence or otherwise in the United Kingdom. Replies to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, W.C.2.

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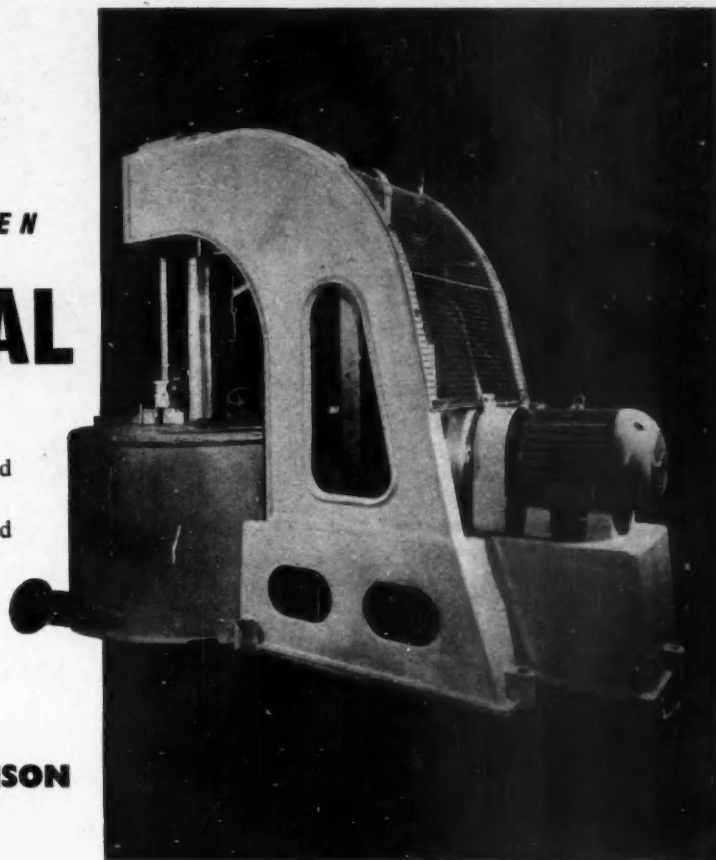
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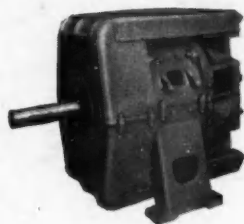
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